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ABSTRACT

Presented at a symposium instigated to improve the accessibility and usefulness of educational technology, the five invited papers presented in this proceedings deal with various aspects of information systems and their relationship to each other. Topics covered were "Educational Technologists as Consumers of Educational Information", "Information Services in Practice", "The Use of Query in Multi-facet Indexing of Information Materials", "The Exeter Abstract Reference System in Higher Education", and "Qualified Citation Indexing--Its Relevance to Educational Technology." Each paper is accompanied by an invited structured response. Also included in the report are responses of participants invited to complete a practical exercise on identifying individual needs in information retrieval, and summaries of the discussions pertinent to that exercise, and to the theme of the symposium. (MER)

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INFORMATION RETRIEVAL IN EDUCATIONAL TECHNOLOGY

Conference Proceedings of the First Symposium on Information Retrieval in Educational Technology, held at ETIC'81, Aberdeen, Scotland,
1st April, 1981

Edited by Elizabeth B Duncan and Ray McAleese

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Summary

The Symposium on Information Retrieval in Educational Technology held at ETIC'81 in April 1981 was instigated by a desire to improve the accessibility and usefulness of educational technology resources.

The format of the Symposium was the presentation of five invited papers on various aspects of information systems and their relationship with users. These papers, together with invited, structured replies, are printed in full in this Monograph.

In addition to the papers, a Task was presented to all participants to think about and complete, with the dual purpose of directing thinking along information-seeking lines, and of producing a basis for further discussion during the day. The nature of the Task, and a brief analysis of responses to it precede the text of the main papers.

The third section of the Monograph is a summary from discussions which were directed in three groups one on each of three important aspects of the day's theme.

The Monograph is introduced by a general chapter on information retrieval in educational technology, which is an overview of points which arose from discussions throughout the day and ways in which future systems might be planned in the light of user reactions to the status quo.

CHAPTER 1

INFORMATION RETRIEVAL IN EDUCATIONAL TECHNOLOGY

E B Duncan, Robert Gordon's Institute of Technology
R McAleese, University of Aberdeen

■ This is a summary of events which took place during a One-Day Symposium on Information Retrieval, held on 1 April, during ETIC'81. The Symposium Programme is listed in the Appendix (Page 88).

Thirty-three delegates, with varied background interests listened to and discussed papers ranging from information-seeking behaviour of educational technology users, through present provision of information services, to possible innovations in relaying of information to users. The theme of the day's discussions was the variety of means by which one can convey information from source to user and consideration of ways in which information might be packaged or filtered to achieve this most effectively.

Educational technology as a subject is an area in which there has been a great deal of controversy in identifying who the users really are. It is an area in which resources are scattered, due to its disparate nature, and access to them is difficult. It is therefore important that both the users and their patterns of information need are clearly identified.

The format of the day was that of a structured seminar, that is, the presentation of five papers, each followed by a formal, prepared Reply. The objective of the Reply was to stimulate discussion and to pose a contrasting view. The presentation of papers was preceded by an information-gathering exercise or task completed by delegates, The day concluded with the formation of three Working Groups discussing separately three topics isolated as being of direct current interest. Each of the three groups reported back to the Symposium before further discussion took place.

TASK

The information need problem was explored in a practical exercise or TASK. Participants were asked to complete, in a space of 10 minutes, a set of questions aimed at identifying individual needs in information retrieval. (See Figure 1) They were asked to identify a recent instance where they had needed to find out something relating to educational technology, and to indicate from a list of ten possible courses of action which would seem the most appropriate. Results from this instant assessment were tabulated and used in discussion later in the day. (Table 1)

SUMMARY OF TASK RESPONSES

From the tabulated responses it is clear that most users were looking either for someone who knows the subject, or for a background review of the subject. Is information provision too abundant? Are filters needed? Compare these categories with the fact that very few people wished to be given a list of more than 100 bibliographic items. Is the most popular category really the most needed, or is it the most frequently thought of? It is difficult to identify on such a brief response whether the replies referred to 'need' or 'use', but a similar, informal survey carried out by the Qualified Citation Indexing Project of approximately 25 potential users from differing educational experience (unpublished) gave an almost parallel pattern of response. (See Chapter 6 for details of the paper on qualified citation indexing).

ETIC'81
INFORMATION RETRIEVAL IN EDUCATIONAL TECHNOLOGY
SYMPOSIUM, 1 APRIL 1981

TASK: Identifying individual needs in information retrieval

Please complete the following to the best of your ability using an instance from your own experience if possible.

NAME:

ORGANIZATION:

TASK:

Think of a recent instance where you have needed to find out something related to educational technology.

Would your need have been met by having one of the following solutions suggested to you:
(Mark with a * any which seem appropriate to your situation)

[1]	An introductory work or textbook	[ ]
[2]	A background review article	[ ]
[3]	Someone who knows something about the subject	[ ]
[4]	Someone who knows something about the literature of the subject	[ ]
[5]	An Organization where the subject is being studied	[ ]
[6]	Courses or Conferences which might be relevant	[ ]
[7]	Software or other AV materials as well as literature	[ ]
[8]	A selected list of literature and/or software to suit your needs	[ ]
	A. selected to 2 or 3 items	[ ]
	B. selected to 30 items	[ ]
	C. selected to 100 items	[ ]
	D. a complete list of all published material	[ ]
[9]	Names of Professional Bodies in the subject area	[ ]
[10]	Any other solution - please specify:	[ ]

Mark the most important with an extra *

Make a brief note of what the topic was: (e.g. distance learning - recent research - UK only)

Figure 1: TASK Questionnaire

	Score	Rank
(1) An introductory work or textbook	8	8
(2) A background review article	20	2
(3) Someone who knows the subject	30	1
(4) Someone who knows the literature	17	3
(5) An Organisation in the field	17	3
(6) Courses or Conferences	9	7
(7) Software or AV materials and literature	10	6
(8) Selected list of literature and/or software		
a) selected to 2 or 3 items	4	10
b) selected to 30 items	14	5
c) selected to 100 items	2	-
d) complete list of all published	4	10
(9) Professional bodies in subject field	5	9
(10) Other solutions	(19)	
Committees 2		
Personal files 1		
Abstracts 2		
Workshops 3		
Trade literature 5		
Popular press 1		
Interview/questionhaire 2		
List of research projects 1		

Table 1: TASK Results

PRESENTATIONS

The presentations consisted of two general papers on information needs and possible solutions. These were followed by reports on two working information systems, and finally, a report on a new form of information retrieval in educational technology, qualified citation indexing.

Information needs:

The present information-seeking behaviour of users as displayed by a small group of American University lecturers was presented in the first paper of the day, given by Professor Donald Ely, of Syracuse University (Director, ERIC Clearinghouse on Information Resources). Professor Ely's paper was on Educational Technologists as Consumers of Educational Information, and described the information-coping strategies of educational technologists, the types of educational technologist, and the purpose of seeking information. He emphasised in particular the danger of designing complex systems for non-existent people in hypothetical situations with unknown needs. The ideal is not to aim for one universal system, but to identify, coordinate and communicate the information options already in existence, and make them available to the individual user.

In reply, Mr N Rushby of Imperial College, London, emphasised the need for identification of real users. There is a possible confusion in people's minds between need and use. He asked to what extent participants considered that users' needs are shaped by what is available. Points raised in discussion reinforced the connection between users' needs and environment, and emphasised the difficulty of communication of need. Intermediaries wer considered to be important, a point which was also brought out by the TASK results, as discussed earlier. The question of what people want is often a function of the way in which the question is asked. People like problems - few like solutions.

Possible solutions to the information-handling problem were described in the paper given by Miss Jane Hustwit of the Council for Educational Technology. Miss Hustwit outlined some of the work of the Council in investigating problems surrounding and blocking access to information. In particular she emphasised the role of the Council in the development of experimental information services and the investigation of the application of new technologies to these problems. The main theme of her paper, however, was a brief description of the CEDAR project on educational computing, centred at Imperial College, London, and a detailed account of CONTACT, the Council's informmtion service on teaching and learning methods. The background, structure and operation of CONTACT were described in full, together with a description of some of the problems encountered in its operation.

Mr M Head (RGIT, Aberdeen) in reply to Miss Hustwit's paper emphasised the value of personal contact in information transfer. This point was also made by Professor Ely, and identified in the TASK results. Several doubts remained, however, on the basic structure of the information held, and therefore of the efficiency of search strategies, in terms of controlled vocabulary, definition of subject coverage and identification of user group.
Discussion centred very much on practical operating details of the system described, and as such indicated a great deal of interest being shown in the concept of a personalised information system. Evaluation of the system by user feedback was considered by some participants to be a point which had been underestimated as a controlling factor in the development of the system.

Working Information Systems:

Two Working Information Systems were described by the next two speakers Mr W J K Davies and Dr D Bligh (the latter paper presented by Miss J Claridge, in the absence of Dr Bligh)

QUERY, developed at Hertfordshire County Programmed Learning Centre, as described by Mr Davies, is a system designed for classroom teachers. Mr Davies emphasised that with a computer-based system, a clear layout of complex information is most important for the user. He pointed out various limitations of the present QUERY system, such as sequential searching, which makes response times relatively slow, and various restrictions on record length and layout. Systems designed for microcomputers tend to suffer from similar restrictions. There is apparently a new, improved QUERY in preparation, although not yet available. It will still essentially be a locally based system, since Mr Davies believes that individuals or groups may usefully develop their own data retrieval systems with their own local idiosyncracies in preference or in addition to using national systems.

This last point was taken up by Mr L McMorran of Aberdeen College of Education Library, in reply. Mr McMorran emphasised the value of local systems for local needs, and specifically for changing needs, but pointed out at the same time that many of the advantages of sophisticated search strategy, and rapid access and interaction for users, at present taken for granted in large systems, are not available to small systems. There is a danger of producing a multiplicity of isolated systems using different programs becoming incompatible either with each other or with a national system. Systems like ERIC, while perhaps not ideal for local needs do at least have the advantage of a carefully constructed thesaurus of controlled vocabulary terms and relationships. As Mr McMorran indicated, terms with vague and ambiguous meaning are not uncommon in the free language of education or educational technology.

TEARS, developed at Exeter University (The Exeter Abstract Reference System) is, like QUERY, essentially a local system, for higher education. Three problem areas in higher education were identified by Dr Bligh as areas in which an information retrieval system could play a part: the system could identify relevance i.e. delineate the field; it could establish authority for included items; and it may direct or assist in mapping the research field. The implications of an information retrieval system can be much wider than the relaying of references, and supplementary services such as an 'interest bank' of research or interest profiles could act not only as a search or alerting service, but as an exchange arena for teachers with similar interests. In the paper, Dr Bligh described the operation of TEARS and the type of record it contains. Complex logic is used in search strategy, but questions remain relating to the amount of information to include, from what sources, and overall evaluative questions of cost and charging. User consultation and user evaluation were also mentioned, and the importance of personal contact to user satisfaction.

In reply, Mr Martyn Roebuck of the Scottish Education Department endorsed the belief that a system to be used must be accessible, and must be needed. In practical terms the cost of a system must compare favourably with other means of retrieving information perhaps more familiar to the user. Problems of recall or precision, and of scale, were referred to briefly as worthy of consideration in designing systems. Doubt was cast on the idea of having a universally acceptable thesaurus or map, since from experience Mr Roebuck had found that the self-correcting hierarchy or concept map was perhaps more flexible.

Qualified Citation Indexing:

The concept of citation indexing may be relatively new to the field of educational technology, but it is well established in other fields. Science Citation Index, Social Sciences Citation Index and Arts and Humanities Citation Index, all published by the American Institute for Scientific Information (ISI), each run to several large volumes per year of very small print. The theme of the paper on qualified citation indexing presented by Mrs E Duncan (RGIT) was that citation indexing techniques are particularly appropriate for educational technology, because of the wide spread of subject interest, the difficulty of identifying a user population and the ambiguities of an international terminology. A qualified citation index, in which relationships between published works would be specified and described by a qualifying term or phrase is being developed in prototype on a DEC-20 computer at RGIT. Phrases such as 'similar research' or 'methodology' indicate the context in which a reference has been quoted. The project is sponsored by the Scottish Education Department and run jointly by Dr R McAleese of the University of Aberdeen and Mr F D Anderson of RGIT.

Mr L Corbett of Stirling University Library, in reply, emphasised the size of files necessarily created by citation indexing - manual handling is impractical, and output includes much 'noise'. Qualifying of citations therefore would appear to be helpful. Other techniques, such as 'cycling' have been used by ISI for similar purposes. Difficulties remaining for the project, and for citation indexing of educational technology, in Mr Corbett's view are those of subject definition, and of understanding of the reasons an author has had for quoting a particular reference - they are not always clear or meaningful!

WORKING GROUPS:

Participants were asked to join one of three groups given the remits shown in Figure 2. The overall aim of the Working Groups was to identify ways in which information needs may best be fulfilled in the three areas specified.

Group 1 discussions centred on the relative importance to users of centralization of information resources, or level of support. Questions raised by the Group were whether centralization implies control, how immediate are most information needs, and how difficult is it to identify the searcher and thus match needs to sources. Results are presented visually below. (Figures 3 and 4)

Group 2 produced a visual map of the topic 'independent study' (Figure 5) with indications of relationships between the concepts displayed. Comparisons with construction of a linear thesaurus were made, and ideas on variation in interpretation of 'level', 'timeliness' and 'value' discussed. It was felt that the graphical technique could be applied very usefully in other subject areas as an aid in identifying relationships between parts of subjects and evaluation of the importance of some subjects in relation to others.

Group 3 concluded that citation indexing could be a helpful approach to an information query, since often the query begins with knowing people or authors working in an area. It could be used as a way of seeing how ideas recur in the literature and could be helpful in solving unformulated queries. Again discussion took place on who the user community will be. A sample search on SOUCIT, the system being developed at RGIT, is included in Chapter 6, following the paper on Qualified Citation Indexing.

Presentations from Groups were made by the three appointed reporters and the issues discussed by all participants. Final issues seen to be important by those present are summarised below.

- GROUP 1:

  This group will consider whether existing resources in educational technology meet the needs of individual users

  - identify the range of resources available
  - classify the resources into a framework that places similar resources together e.g. books, journals . .
  - agree on reasons where existing resources don't seem to meet the conditions you expect
  - report on some suggestions as to how resources might be made more useful

- GROUP 2:

  - identify an important concept in educational technology
  - list 11 related concepts
  - construct a 'map' of the concept identified i.e. indicate the relationships between the prime concept and the related concepts
  - report on how the mapping technique may be usefully applied to other areas

- GROUP 3:

  - undertake a citation search on the QCIP citation data base
  - list the ways in which the retrieval system can help the user
  - report on the ways in which the system could be improved

Figure 2: Working Groups - Remits

WORKING GROUP 1 - RESULTS

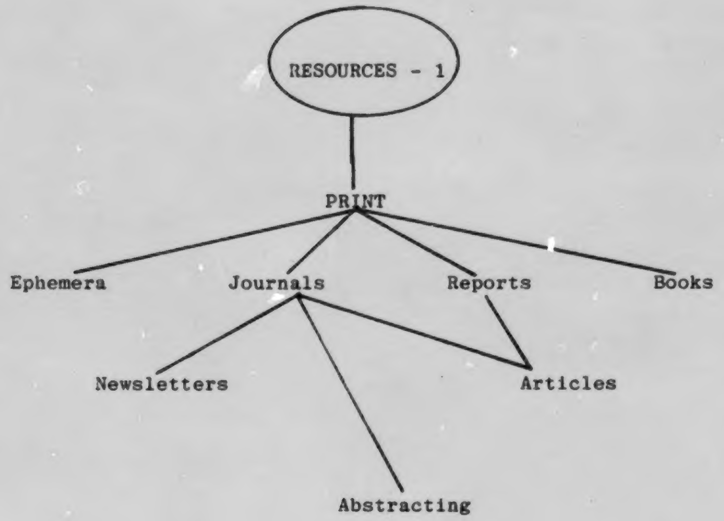
RESOURCES - 1
PRINT
Ephemera
Journals
Reports
Books
Newsletters
Articles
Abstracting

Figure 3: Printed, or 'media-based' resources

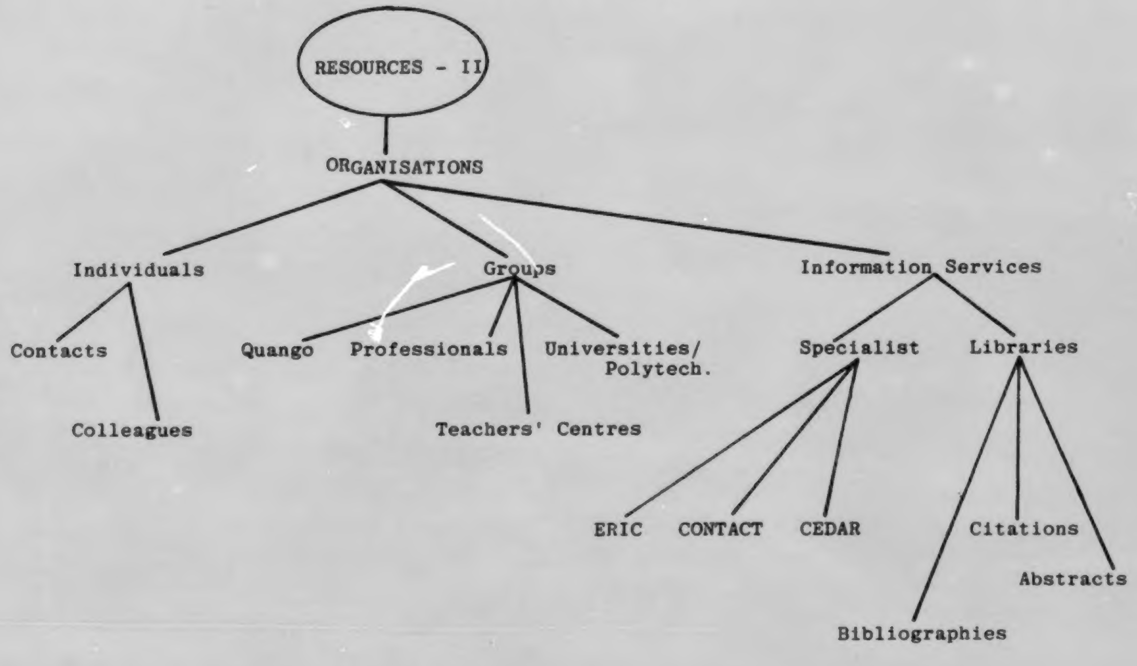
RESOURCES - II
ORGANISATIONS
Individuals
Groups
Information Services
Contacts
Colleagues
Quango
Professionals
Universities/ Polytech.
Teachers' Centres
Specialist
Libraries
ERIC
CONTACT
CEDAR
Citations
Abstracts
Bibliographies

Figure 4: Organisational, or 'people-based' resources

WORKING GROUP 2 - RESULTS

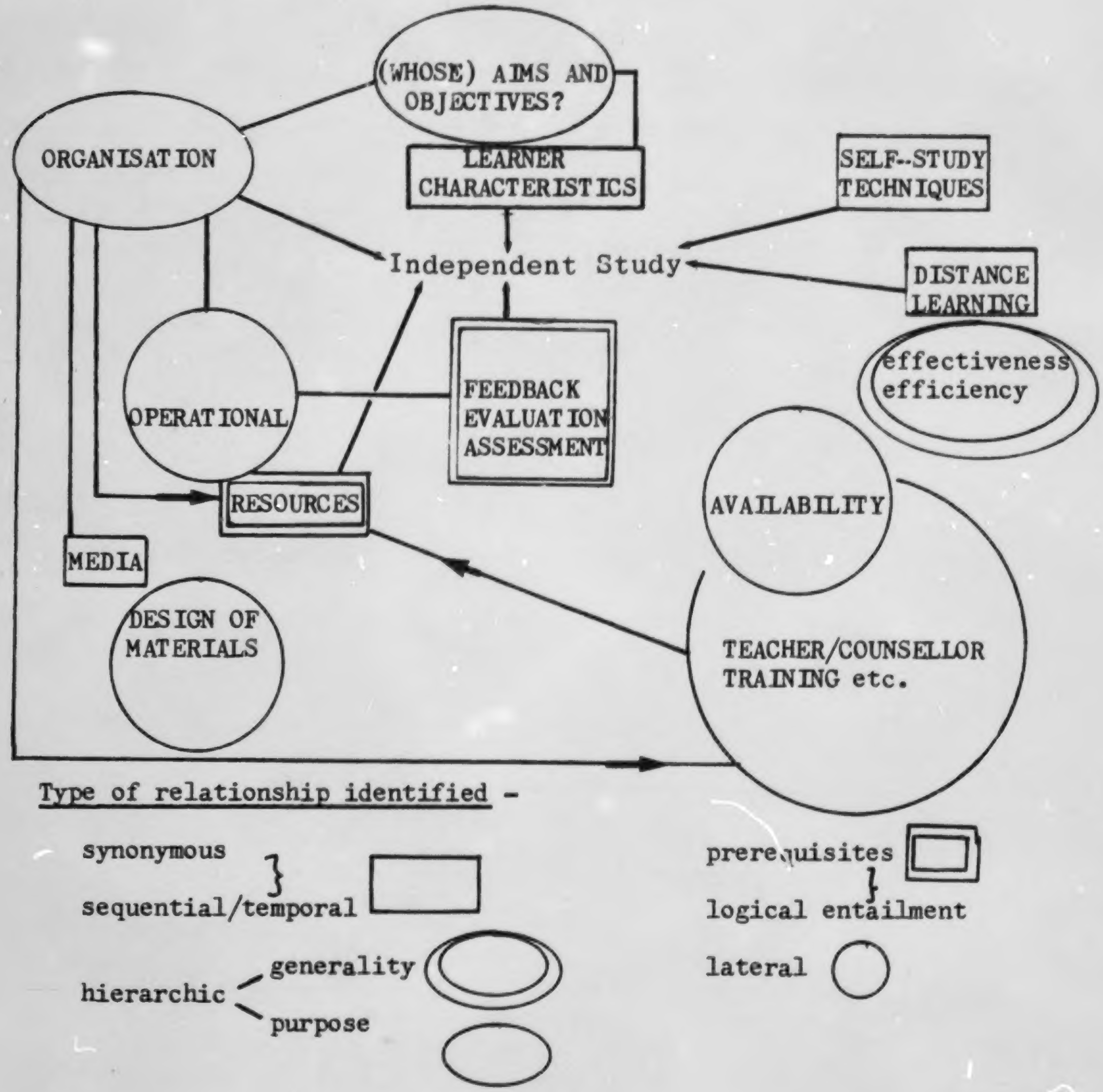
(WHOSE) AIMS AND OBJECTIVES?
ORGANISATION
LEARNER CHARACTERISTICS
SELF--STUDY TECHNIQUES
Independent Study
DISTANCE LEARNING
effectiveness efficiency
OPERATIONAL
FEEDBACK EVALUATION ASSESSMENT
RESOURCES
AVAILABILITY
MEDIA
DESIGN OF MATERIALS
TEACHER/COUNSELLOR TRAINING etc.
Type of relationship identified -
synonymous
sequential/temporal
hierarchic
generality
purpose
prerequisites
logical entailment
lateral

Figure 5

'Map' of the concept 'independent study' *

(*This is an unedited version of the transparency presented by the Group)

ISSUES:

From the variety of presentations during the day - the papers, the TASK, the Working Groups and the discussions - a number of issues emerged. These issues are important as they indicate the problematic nature of educational information retrieval, and perhaps provide indcators to the future. In summary the issues were:

1. WHO is the searcher? It is important to begin with the SEARCHER - after all, no system would be needed if there was no enquirer. Is it an experienced research worker, or is it a student learning the subject and the language of the subject? Different searchers need different facilities and different types of information.

2. LEVEL OF SUPPORT - Where is the information to be located? Will the focus be local or national or international? A local information retrieval system has very different characteristics from those of an international facility. A good comparison to make this point would be the Exeter system, TEARS, (described by Bligh), and ERIC.

3. IMMEDIACY - How soon does the user need the information? Will tomorrow be too late? What do we know about the 'intellectual windows' where researchers and thinkers need to know that missing piece of information IMMEDIATELY before they can continue with their creative thinking? Does one need on-line search facilities or will a postal retrieval system meet the needs of most users?

4. PRESENTATION - Is it good enough to see the information on a VDU screen, or does the searcher need the hard copy of printed text? The ergonomic, as well as social and psychological issues with regard to user interaction with data are far from clear. Can systems be made user-friendly for the interactive and mediated searcher?

5. Is there a need for INTERMEDIARIES? Is there a role for the information scientist to counsel the searcher and identify profiles and user needs? Who is best qualified to make the intervention? Librarians and information scientists, or subject specialists?

6. Are there LIMITS TO TECHNOLOGY? Can the technological answers provided by large computer-based systems get in the way of the searcher? Are we in danger of looking for elegant technical solutions when the searcher needs the feel of a few back copies of a journal, or an hour browsing from shelf to shelf in a library?

The Symposium did more to raise to the surface some of the issues than to provide solutions. Perhaps the model of the symposium, in which some of the thinking was left to the participants, is one which the information scientist must consider when designing information systems. An ideal solution is often one where some of the decisions are left to the searcher and where most of the hard drudgery of searching is removed. By the time the Second Information Retrieval Symposium is held in 1982, some further issues will emerge and perhaps some clarification may be made on the information needs of the educational technologists.

CHAPTER 2

Educational Technologists as Consumers of Educational Information

Donald P. Ely

Syracuse University

Information is a basic commodity in the world of the educational technologist. It is needed for clients and colleagues as well as for personal use. As in other fields, it is available in greater quantity and in more locations than ever before. The saturation point may have been reached and exceeded. Like other professions, educational technology is suffering from information overload.

The overload phenomenon creates a situation in which the educational technologist can no longer carry all the needed information in his or her head and must adopt information seeking strategies which help to obtain needed information. These information seeking strategies become increasingly important as more and more information becomes available and as technological systems contribute to the professional's ability to cope with the mass of information.

Information used by educational technologists is not produced in any systematic fashion. New journals appear with increasing frequency; publishers release more titles in the field each year; reports from governmental agencies and professional organizations have reached the proliferation stage; and still it goes on. Yearbooks, dictionaries, encyclopedias, and books of readings are signs of maturity in the profession but they also add to the volume of information with which the consciencious educational technologist has to cope.

Information Coping Strategies

What are the coping strategies? Informal conversations with professional colleagues have revealed a wide range of coping behaviours. For example,

- One educational technologist has narrowed his professional reading to those journals and reports which encompass his specialized area of interest. He has "given up" trying to relate his specialty to the larger context of the field.

- Another person scans journals, reports, books, and other literature to provide an awareness of current developments but he does not read extensively or deeply in any one area. If he needs information, he depends upon recall to retrieve the specific item he requires.

- Still another person holds on to familiar information which she has used in the past and continues to use it. She reads newsletters and state-of-the-art articles in journals to keep current.

There probably are as many strategies as there are people in the field. Each professional seems to have his or her own profile for information seeking.

Major Information Sources

Several attempts to control the information explosion have been made. Notable among these attempts is the ERIC system in the United States. The Education Resources Information Center (ERIC) system was established in 1967 to capture the "fugitive" literature in Education: reports, speeches, curriculum guides, conference proceedings and other ephemeral materials which do not usually get into the mainstream of educational information. The rationale for gathering, storing, and making available fugitive information is that literature which is published by commercial houses and major organizations and agencies is generally known and easily available. The more obscure literature, much of which would be highly valuable to some users, is not known and is rarely accessible. In 1969, ERIC began to index journal articles. The total number of citations for documents and journals at the end of 1980 was approximately 420,000 items. Thus ERIC began with separate clearinghouses responsible for specialized fields. In educational technology, the original clearinghouse was named "educational media and technology". It later merged with "library and information science" to become "information resources", its present designation. ERIC has become one major source of information about educational technology.

Other efforts to manage information have been brought about by synthesis volumes such as the Educational Media Yearbook (Brown, 1980), the Encyclopedia of Educational Media Communications and Technology (Unwin and McAleese, 1978) and the International Yearbook of Instructional and Educational Technology (Howe, 1980). Each of these volumes offers one source of comprehensive information about the field.

To provide timely news about current developments in the field, several newsletters seem to serve the purpose: Educational Technology News (from AETT), ect (from AECT), and dozens of local update newsletters which are brief, inexpensively printed, and devoted more to announcements and current activities than to substantive matters.

There are several major publishers which emphasize educational technology: the Association for Educational Communications and Technology, the Council for Educational Technology of the United Kingdom, Educational Technology Publications, and Kogan-Page. Of course there are many more publishers of books in the field of educational technology, but these seem to have the most extensive catalogs and probably represent the majority of sales in the field.

Information Needs of Educational Technologists

Given the multifarious sources of information in the field, where does the educational technologist go for information? The question seems straightforward enough but it is necessary to narrow it still further.

- What type of educational technologist? the researcher? the administrator? the professor of educational technology in a tertiary institution? the producer of materials? the instructional developer?

- What is the specific purpose of seeking information? to write a paper? to prepare a speech? to justify a budget? to answer a colleague's question? to become better informed?

- What resources beyond published sources might be used? personal files? colleagues? audiovisual materials?

These questions were inferred in a paper presented by Ely at the ETIC 79 conference at Sheffield:

> Improvements in the current information environment for educational technologists should be preceeded by a study of the information needs of the population. Input criteria and output potentials should be altered accordingly. Existing systems should be modified rather than to create new systems (p. 315).

Pilot Study of Information Needs

In an attempt to focus on the information seeking behaviours of the educational technology population, a pilot study was planned and conducted among 42 chairpersons of doctoral programs in educational media and technology in the United States listed in the Educational Media Yearbook 1980 (Brown, 1980). Faculty members from four large academic programs in educational technology were also part of the test population. The total number of individuals querried was 60; the response rate was 70%.

Individuals who teach educational technology were selected as the first group for study since they are likely to use many and diverse sources of information. Presumably there is a higher percentage of authors among this group than among other groups within the field. The need for information is, therefore, highly specific. Information is probably more important for this group than to any other identifiable group within the field. The pilot group could serve as a prototype for other identifiable groups within the field, i.e., educational technology administrators; instructional developers; and media designers and producers.

The study probed four questions:

1. What sources are used for current awareness of new developments in the field?
2. What sources are used for six specific purposes:
    a. Preparation for teaching?
    b. Writing a manuscript?
    c. Preparing a speech?
    d. Responding to colleagues' questions?
    e. Case studies?
    f. Budget justification?
3. What professional journals are read and how are they used?
4. What are the preferred formats for awareness information and research information?

It was thought that answers to these questions would provide sufficient indicators to describe the information seeking behaviours of this group of educational technologists. It also would help to develop strategies for targeting information to this audience. What was discovered?

Findings of the Study - Sources Used

Individuals who head educational technology departments and teach in tertiary institutions use professional meetings most frequently for current awareness about new developments in the field. The meeting most frequently mentioned was AECT - the Association for Educational Communications and Technology, followed closely by AERA - the American Educational Research Association. Informal contacts was the next most frequent category for current awareness. Both face-to-face and telephone contacts were about the same. Relatively high, but third in frequency were newsletters with the ERIC/IR Update and the Chronicle of Higher Education being the most frequently mentioned items. The individuals who responded to the survey seem to use all three modes for current awareness with a relatively high frequency.

In the report by Gilbert (1979) individuals from 9 higher education institutions in the U.K. were interviewed about the use of educational technology research. In response to one question, "How do you find research results?" Gilbert reports that the responses "might have been influenced by the facilities available, personal motives for seeking such results and perhaps even a range of developed capacity for the use of resources. He indicates that the following approaches are widely used:

1. Personal literature surveys, ... To the so called 'ed. tech.' literature is being increasingly added an examination of those professional discipline journals in which relevant articles appear.

2. Abstracting services ... However, no comprehensive abstracting service is yet available in the absence of a commonly agreed categorization system.

3. Personal discussion. This takes place either through an informal network ... or at conferences".

Other approaches include the use of bibliographies on specific areas, books, and ERIC (which, according to Gilbert, is little known or used).

In attempting to dicover primary sources of information, six common uses of information were determined:

- preparing for teaching
- writing a manuscript for publication
- preparing a speech
- responding to colleagues' questions
- locating case studies

Use of Professional Journals

Since professional journals are considered to be a prime source of current research and development information, it seemed useful to inquire into which journals were read, the nature of their use and the extent to which they are retained for future use. Table 2 presents the findings in regard to journal use.

Educational Communications and Technology Journal	93%
Instructional Innovator	86%
Educational Technology	83%
Journal of Instructional Development	81%
THE Journal	38%
Public Telecommunications Review	31%
British Journal of Educational Technology	31%
School Media Quarterly	31%
Instructional Science	29%

Table 2 Journals Read by Academic Educational Technologists (n = 42)

Respondents were given the option to indicate the extent of use: "read thoroughly," "read selectively," or "scan". In every instance, more persons "read selectively" than "read thoroughly" or "scan". For the four most frequently read journals, an average of 17% of the readers read the journals thoroughly. When asked to indicate the disposition of each journal, "save," "pass on," or "throw out," the most frequently read journals were the ones most frequently saved and very few journals were reported to be "thrown out".

Other journals listed had fewer than 12 responses: Journal of Computer Based Instruction and the APLET Journal. Thirty-one additional journals were named by the respondents. The most frequently mentioned were Review of Educational Research, AERA Journal, Media and Methods, Phi Delta Kappan, Educational Leadership, and NSPI Journal - all of which had four to seven nominations.

In a study done by the Association for Educational Communications and Technology in 1977, 2,612 respondents, 36% of whom were from higher education institutions, Audiovisual Instruction (now Instructional Innovator) was the most frequently read journal (89%), Media and Methods was second (56%) and Educational Technology was third (44%). The results are reported on the total population, not just the higher education portion.

Another study corroborates the findings of this survey. Moore (1981) asked 350 professionals who were members of the Association for Educational Communications and Technology (AECT) in the United States to rank order (from a list of 11 professional journals) "... the three you consider to be most influential within the field of instructional technology". Individuals were told that they could name journals not listed. The 142 respondents, 33 of whom were college professors in the field, rank ordered the journals as follows: Instructional Innovator (75.4%), Educational Communications and Technology Journal (45.1%), Educational Technology (44.4%), Media and Methods (44.1%), Journal of Instructional Development (26.8%) and Educational Broadcasting (9.9%).

The same population was asked to rank order "... from the following list of professional journals the three you consider to be the most scholarly within the field of instructional technology". Journals could be added to the list. (In fact, a total of 44 journals were mentioned on the forms).

Educational Communications and Technology Journal	78.5%
Journal of Instructional Development	57.0%
Educational Technology	38.5%
British Journal of Educational Technology	19.3%
Instructional Innovator	18.5%
International Journal of Instructional Media	14.8%

It seems reasonable to conclude that journals considered to be "most influential" in the field and those which are considered to be "most scholarly" by a general population of educational technologists, are those journals which are read most frequently by academic educational technologists, except for two journals considered to be influential, Educational Broadcasting and Media and Methods, and one considered to be scholarly, the International Journal of Instructional Media.

Preferred Formats

A final question had to do with the preferred format for awareness information and research information. For awareness, 64% of the respondents preferred professional journals and 38% preferred specialized newsletters. For research information, abstracts and journal articles were equal; half prefer abstracts, half prefer articles. No one appeared to want complete research reports.

Limitations of the Study

As with any pilot study, certain cautions must be stated. The population is limited to individuals who teach educational technology in tertiary institutions. Their needs for information and access to it are probably quite different from other populations within the field, e.g. instructional developers and managers of media programs. The population studied is more likely to seek research-based information and to read journals which report research.

Findings and Generalizations

With these preliminary findings in mind, it would be useful to test them against a list of generalizations about information needs in a number of fields derived from more than 100 studies and summaries of studies (Fabisoff and Ely, 1976) in the literature on user information needs. The list of generalizations is highly tentative and in need of further corroboration. They were developed on the basis that some evidence, however meager, is better than none at all. Therefore, caution must be exercised in using the list.

1. People tend to seek out information which is most accessible. This study confirmed this generalization. In every instance of information seeking, personal files were reported to be the first source used. For service activities such as locating case studies or budget justification, face-to-face and telephone contacts followed personal files in frequency. For academic pursuits such as preparation of a manuscript or speech, the university library was used.

2. People tend to follow habitual patterns when seeking information. It seems obvious that one would first seek our information in a personal file. This habit seems to dominate even when the library is a more obvious source to locate information for academic purposes. It may also be a function of distance and ease of access.

3. Face-to-face communication is a primary source of information. Studies of professionals and researchers in a variety of fields indicate that they often contact other professionals and researchers they know have the information required at the moment. In this pilot study, face-to-face and telephone sources ranked just below personal files for service-type information and somewhat lower for academic information.

4. The information needs of the individual change at different career stages and with changes of projects. "It is, perhaps, self-evident that informaton needs will vary not only according to the subject interest of the users, but likewise in relation to the type of activity in which they are engaged". (Rees, 1963) In this pilot study, it appears as if the strategies used for obtaining academic information vary with those in seeking service-oriented information. There are probably very few needs which recur regularly which individuals do not form a strategy for meeting. The changes of information needs over time differ in substance as well as in source.

Guidelines for Designers of Information Systems for Educational Technologists

While it is risky to use the findings of one small pilot study to create information dissemination strategies for an entire field, it seems worthwhile to propose some tentative guidelines which build on similar studies performed for other professional fields. The tentative nature of these recommendations must be underscored. Alan Rees' observation (1963) that the information retrieval field has been plagued for many years by busy people spending huge sums of money, designing - or attempting to design - phantom systems for nonexistent people in hypothetical situations with unknown needs must be borne in mind.

A small but ardent core of researchers has addressed the information needs question. (Menzel, 1960; Brittain, 1970; Line, 1971; Dervin, 1973) "Their investigations produced results. The users were identified and their needs characterized. Regardless of dicipline, occupation, or level of education of the user, certain patterns of needs common to all began to appear. These patterns had implications for the improvement of and development of new information systems". (Fabisoff and Ely, 1976) Specific guidelines for educational technology information systems are drawn from a larger list of guidelines.

1. Identify the specific information the user actually needs or requires for what he/she is doing.

   To design information systems without knowing the information needs of users seems to belabor the obvious. However, this principle is often overlooked. Brittain (1970) observes that "There is... a movement toward a receiver controlled system and movement away from a source controlled system. The attention to user-oriented information systems is only one example of a growing phenomenon". Computer based information systems make the user orientation more feasible today than ever before. ERIC is a good example of such a system.

2. Identify the user in relation to his/her discipline or environment.

   It is not enough for the information systems designer to know that an individual is an educational technologist. Subgroups within the field must be identified since each one requires a different type of information to satisfy his/her needs. Replications of the pilot study with different groups of educational technologists would probably yield quite different information seeking patterns.

3. Information should be provided in a form suitable for its effective use.

   A well-designed system should be tailored to suit the requirements of its users and should not place upon the user an undue burden of mastering a new discipline. The population in the pilot study said they wanted awareness information in professional journals and research information in abstracts and in journal articles. Journal editors take note! ERIC provides information by title and abstract and complete reports. Very few academic educational technologists want the complete report.

4. Information should be stored in such a way that it is not only available but easily accessible.

   The system should be as simple to use and as accessible as possible. The principle of least energy and effort applies here. Dervin (1973) identified five dimensions of accessibility:

   - Societal accessibility - must be available in the social system.
   - Institutional accessibility - must be capable and willing to deliver needed information.
   - Physical accessibility - individual must be able to make contact with the source.

- justifying a budget

Five common sources of information were listed:

- personal library or files
- face-to-face contact with a colleague
- telephone contact with a colleague
- department or colleague's library
- university library

Respondents were asked to indicate, in priority order, which sources would likely be used for each purpose. Table 1 reports the results based on 42 replies using the modal response.

	Personal Files	Face-to-Face Contact	Telephone Contact	Department or Colleague's Library	University Library
Preparation for Teaching	1	3	4,5	—	2
Writing a Manuscript	1	3,4	5	—	2
Preparing a Speech	1	3	5	4	2
Responding to Questions	1	2	3	4	5
Case Studies	1	2	3	4,5	5
Budget Justification	1	2	3	4	5

Table 1 Information Sources Used by Academic Educational Technologists for Six Purposes

With this particular audience, it seems quite clear that a person's own library and file is a prime information source for virtually every purpose. For more scholarly activities, such as teaching, writing, and speech preparation, the individual turns to the university library while for more applied matters such as question answering, case studies and budget justification, person-to-person contacts and telephone contacts seem to be major sources. The use of a department or colleague's library does not seem to be a dominant source for any purpose.

- Psychological accessibility - individual must be willing to approach appropriate sources and believe that answers can be obtained.
- Intellectual accessiblity - individual must have ability and training to acquire and process needed information.

5. Since oral communication is an important feature of gathering information, the system should devise ways for facilitating the dissemination of such information.

Informal channels of communication referred to as invisible colleges are frequently the most significant means of obtaining information. The pilot study showed that such sources are often preferred over more formal sources. The fact that professionals consider professional meetings as a prime source of awareness information is further confirmation of this source being a vital element of almost any information-seeking activity. It would seem, therefore, that directories of programmes and personnel and professional meetings ought to be planned and promoted as information sources. The professional educational technology associations (such as AETT and AECT) provide a major information system incorporating opportunities for oral communication (through annual meetings) along with publications, newsletters and adjunct nonperiodical publications. It probably would be difficult survive in today's information environment without an active professional association.

Closing Words

I do not want to make more out of a pilot study than it deserves. This little effort is but one more indicator of information use by a sample of one professional population. It can be added to the cluster of studies of the same genre.

What I am attempting to show here is the variety of information seeking strategies used even within one small group. I am attempting to point out the need for co-ordination among the wide variety of information sources. Increasing the number of information sources does not necessarily mean better information. But better understanding of *who* the audiences are and *what* information needs they possess should help to develop more efficient use of the information sources currently available. Just as instructional protocols can be systematically developed to achieve predetermined objectives, so can information sources be configured to meet specific information needs of specialists. Just as front-end analysis and formative evaluation have been integral to well-designed instruction, so should information needs and information seeking behaviors be factored into the design of information systems for educational technologists.

I should clarify the reason for purposive design of information systems. It is not to create one ideal system for all to use but, rather, to identify, co-ordinate, and communicate the information options available and to facilitate the availability and access to the individual user. Beyond availability and access is the need for assistance to help the user orchestrate the multifarious resources to meet his/her specific information need. Mere availability will not suffice if the individual does not know how to manipulate the sources to achieve personal objectives.

The next step seems to be the development of a pilot information system which takes into account the user variables.

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Reply

N. Rushby, CEDAR, Imperial College,

Questions arising from the paper given by Professor Ely can be summarised as follows:

1. Is there a conflict in journals between -
    a) what the authors want to write?
    b) what the editor wants to publish?
    c) what the reader wants to read?
    d) what the reader should read - and if this, who says so?

2. Similarly in information services - is there a conflict between -
    a) what information is available?
    b) what we can include (in terms of available resources)?
    c) what users perceive they want?
    d) what users really want?

3. What about subject teachers who are not specialists in information seeking?

Is there confusion in some minds between uses and needs?

To what extent are users' needs shaped by what is available?

CHAPTER 3

Information Services in Practice

Jane Hustwit, Council for Educational Technology, UK

The Council for Educational Technology, since its creation in 1973, has always taken an active interest in the problems surrounding and blocking access to information - information which may be of use or value to educational technology practitioners. For example, the publication of Gilbert's investigation into the use of research findings by practitioners of educational technology (1977) and the complementary work by Clarke and Dunn from Glasgow, also published in 1977.

During the last couple of years we have also become more aware of the number of Council activities which have a key information element in their successful design. The major development project on open learning systems has both an information service and a newsletter, created specifically to inform people about this work. Those working on the regional coordination of educational technology arrangements are also producing a newsletter to ensure that their constituency is informed. In addition, over recent years, there has been a tendency to focus on the difficulties often experienced when attempting to provide the educational practitioner with a means to locate information. Given the diversity of disciplines and subjects considered as comprising educational technology and the range of people interested in using educational technology to improve their teaching, this generates fairly sophisticated problems.

The Council has recently been working in two broad areas - the development of experimental information services, coupled with a continual investigation of the application of new technologies to these problems. It is the first that I would like to discuss here. Before discussing CONTACT, the Council's information service on teaching and learning methods,[1] I would like to look briefly at the experience of our information officer based at CEDAR, Imperial College, London, who was appointed in 1980 specifically to work on computer-based education.[2]

The CEDAR project was set up in 1977 with the aim of encouraging and facilitating the development and effective use of educational computing both within and beyond Imperial College. It benefitted considerably from access to the stock of computer based learning materials and information which had been collected by the National Development Programme for Computer Assisted Learning (1972 - 77).

The information service, originally designed to serve the College, rapidly grew to provide a more general service for theeducational and training community. It now provides a variety of information about computer based learning:

- general descriptions of computer assisted and computer managed learning
- descriptions of specific educational computing projects
- information about the implications of computer based learning for curriculum design and assessment
- information about the technology associated with computer based learning.

From 1978 onwards, the amount of information available through CEDAR grew substantially and the number of enquiries rose dramatically. At the same time, the Council was acting as supplier of 'aftercare' for NDPCAL. This involved providing an information service on computer based education, as well as other tasks. Here also the number of enquiries shot up and staff resources became overstretched. So it was agreed in late 1970 that the Council would fund a full-time information officer to operate and develop the CEDAR service further.

This person would be required to:

answer external enquiries about the application of computers to education with access to the CEDAR databases, bibliographic sources and records of experts;

systematically develop the records of experts and their expertise;

collect material for publication in CALNews.

These activities would, it was agreed, all contribute towards the maintenance of a central information referral point for enquiries about the application of computers in education.

I would like, at this stage, to point out the differences between this service and that offered by CONTACT.

1) The bulk of the enquiries are received and answered by post and telephone, although the project does receive a number of visitors.

2) There is an important collection of resources and materials to be used and maintained by the information officer. The college funds a database holding details of books, reports and papers on computer based learning and related topics, and details of CBL packages available in the UK. The database can be searched on line for specific enquiries and it is also used to produce catalogues, both in print and microfiche form.

   The information officer also has access to the CEDAR collection of publications, housed within the main college library. These resources have grown in the past year - the CAL Package Index has been increased from 400 to 500 packages, and the CAL Bibliography from 1400 to 3000 entries. A People and Projects Index has been set up recently, for instance files on Primary Schools, Handicapped People, English Teaching have been created, according to demand.

   Ideally she should also be able to demonstrate computer assisted learning to visitors, but there are, as yet, insufficient resources available.

3) The information officer has a responsibility for providing the basic copy for CALNews. This free newsletter is circulated,

three times each year, to all types of educational and training institution, all over the world, and appears to be much appreciated.

It should be emphasised that our work with CEDAR was developed as a response to a clear and pressing need, experienced very acutely by staff already working in the area. CONTACT's creation was quite different as the project developed out of discussions amongst staff at CET which were, in turn, provoked by research and ideas prominent in 1976. The main theoretical concern was to improve the dissemination of information within the education and training system, particularly information about practical applications of educational technology. It was apparent that much wasteful duplication of effort could be avoided if a practitioner wishing to introduce a new teaching or learning method in his or her institution could be put directly in contact with someone with experience and expertise in that area.

These discussions coincided with the final report of the Nuffield Group for Research and Innovation in Higher Education. This put forward the view that innovation in higher education depended more on contact between people than on elaborate documentation.

"The exchange of information works best, it seems, if it is personal. A lecturer in one polytechnic is more likely to contact a lecturer in another polytechnic about a new .... development (if he believes it might be relevant to him) than to read a lengthy description of the scheme. In other words, contacts between people are at least as important as documentation, and this country is small enough to make the former feasible and natural .... It is tempting in the present economics climate, to think of waste only in the more obvious, material terms: but there is little point in saving time and money if at the same time one is squandering talent or throwing away good ideas".[3]

At the same time, the Council became aware of NEXUS, an information system then operating in the USA under the auspices of the American Association for Higher Education. This was a telephone operated 'people bank', a linking service connecting enquirers with knowledgeable practitioners in the field of enquiry. Anyone connected with higher education embarking on a new project or development could dial NEXUS and expect to be put in touch with someone who had relevant experience in that field.

Eventually it was agreed that an information service should be designed to share and utilise the practical knowledge and experience of many educationalists who were, at that stage, unable to disseminate it in any way themselves. Again the Nuffield Group's report stimulated the initial thinking "some of the best suggestion for avoiding waste are ... local ones, born of local situations and local possibilities. The man or woman on the job knows more about it than anyone else, and hence often understands best where useful changes can be made. (Therefore we wished) to focus attention on such local ingenuity and to emphasise its importance".

CONTACT was set as a telephone service, designed to provide enquirers in higher education with information on teaching and learning methods, when they need it. It is a referral service, the information provided being the names, addresses and phone numbers of people with experience and expertise in the field of the enquiry.

Between 1.00 p.m. and 4.30 p.m. every weekday, the CONTACT information officer is available to receive calls on the special CONTACT telephone number. After a preliminary discussion, in which the enquirer's needs are carefully explored, a computer index is used to produce references to a number of record cards. These are then consulted by the information officer, who selects the most appropriate and gives that information to the enquirer. Most enquiries are dealt with within 48 hours, some can be answered at once.

Some examples of CONTACT enquiries:

- Is anyone using computers in biology teaching to illustrate points either in practicals or lectures?
- I need to speak to someone with experience in the teaching of mathematics to groups of social scientists and accountancy students with mixed academic backgrounds.
- I want to know how I can assess student and staff reaction to the use of ETV in chemistry.
- Is anyone in law using other than traditional teaching methods or using innovative assessment methods?
- How can I help a student with dyslexia?
- Can you help with problems of field courses - not necessarily in geography?
- Study skills for mature students - I'm having difficulty in getting them to open up in seminars.

I will now look at the special features of the CONTACT system in more detail.

1. Structure

The basic concern, when creating the database, was to ensure that developmental work was located and the details stored. The aim was to develop a repository for contemporary information about work which may, in fact, never make the printed page - the small localised pieces of work that the practitioner is too busy to write up.

Construction of the database had to be undertaken immediately CONTACT was officially set up. A difficult task since it was quite impossible to forecast the range or type of calls. The problem was approached in three complementary ways:

1.1 through scanning journals, periodicals, newspapers, bulletins, reports of conferences, workshops and seminars.

1.2 by fully utilising the "grapevine" that always exists in any particular area of interest, and by recording the new information uncovered whilst answering a specific enquiry.

1.3 by means of a questionnaire-type card, circulated throughout institutions of higher education.

This was brief and to the point. It was mailed together with an information sheet setting out CONTACT's aims and activities. This also doubled as publicity material. The cards were circulated by 'link people' in every institution and were to be completed and returned to CONTACT. This system has now developed into a three-stage annual mailing.

The success of an information retrieval system depends largely on the efficiency of the keyword system. In CONTACT's first phase, keywords were created without limitations as each CONTACT information card was received, or filled in from journal scanning since the area to be covered was, to a large extent, unknown. This unrestricted use of keywords was valuable in that it helped to define the possible areas of importance in CONTACT information. From the first 801 information cards, about 1200 activities cards were created, and these formed the basis for the subsequent keyword system. This method does also, of course, mean that the database is as cross-disciplinary as its users.

A critical aspect of any keyword system is the kind of physical support system available. With CONTACT it was decided to use a computer for keyword searching, and fortunately discussions with the University's Computer Unit resulted in the development of a simple interactive program, tailored exactly to CONTACT's needs.

In addition to the alphabetic lists of keywords, a taxonomy of keywords has been created, to enable retrieval when the keyword was not known. This was created from the initial keywords. Several taxonomies were considered and eventually the SRHE abstract index chosen as an initial classification. This taxonomy is regarded as a framework which can easily be modified as new developments occur.

2. Updating the information

Not only does the CONTACT system incorporate new information but, so as to reflect the current state of a person's work and whereabouts, it must also update old information. Here the use of an interactive computer file is infinitely preferable to the time-consuming labour-intensive retrieval of dozens of cards from a manual file, particularly as additions and deletions can be made at the same time.

CONTACT's service is tailored to the needs of each enquirer, for instance each card can be discussed with the enquirer and accepted, or rejected, extremely quickly. Replies are paced to the caller's speed for, with CONTACT, the computer is seen as just one of several tools, certainly not master. It is intended that the information officer should always be free to give complete attention, as far as is humanly possible, to the caller.

3. Speed

Although it is generally agreed that journals can provide an effective current awareness service, this frequently does not meet the practical and urgent need for information experienced by a practitioner. Information on trends, issues and current events has a certain and justified value but even this can be easily reduced by long drawn out publication schedules which can delay the appearance of a research report for perhaps two years. In addition, the cost of specialist journals is escalating which will, no doubt, eventually minimise the practitioner's access to this sort of information.

Simple telephone based information services remove this crucial delay. It becomes possible to speak directly to the researcher, to immediately get the benefit of expertise and experience. Ultimately the practitioner may feel that s/he needs to refer to written material, but after having, without delay, discussed the particular problem with an expert.

Such a system also provides a researcher with some immediate external recognition of her work. This is particularly valuable where the development falls outside formally defined research fields - for example, the creation of a new teaching or learning technique.

4. Paperwork

With this service, there is no need for a postal follow-up or computer print-out. All the information given to the enquirer by the CONTACT information officer is recorded by her and is retained so that s/he can refer back to it at any time. All s/he needs to remember is the CONTACT phone number. This, of course, obviates the need for a personal storage and retrieval system for potentially useful information. It should also be noted that many academics don't have secretaries and frequently appear incapable of organising and filing material without one.

5. Interrogation

Since its inception, one of the most interesting features of CONTACT has been the role of the information officer, particularly as interrogator and/or counsellor. In essence the enquirer is helped to clarify his information needs by discussion with the information officer. This brief interaction can include many diverse and delicate elements and utilises the sophisticated skills of the information officer. These elevate such a simple system into something very worthwhile. It could be argued that CONTACT's concern is primarily for the enquirer as a person, rather than for the enquiry. This emphasises the difference between this service and, say, a good library. A librarian is usually unable to offer the one to one concentration which is certain to occur over the phone. Talking to someone within the same institution may inhibit the enquirer - s/he may feel nervous of appearing foolish and thus prefer the distancing effect of the CONTACT system. It is impossible for body language to divert attention and the relative anonymity can be relaxing, whilst retaining a highly personalised feel. On a very practical level, there may be no one within the practitioner's institution able to help in any way at all.

Such a relaxed exchange can ameliorate any feeling of machine domination within this increasingly technological world, and the discussion does, of course, lead to a far more accurate enquiry. Indeed the CONTACT officer is an interviewer, counsellor, adviser, there to help not bully, advise not order and to match the query to an answer in the shortest amount of time.

Indeed, it is worth considering whether CONTACT's success is related in any way to the fact that the information officer is a woman, as is the information officer at Imperial College's CEDAR project? It could be argued that given current social attitudes, male academics may find it easier to expose their ignorance, and possible weaknesses, to a woman who they may, subconciously if not conciously, regard as inferior? An interesting thought when looked at in the context of the received wisdom that women are "good listeners"!

Before looking at difficulties encountered by CONTACT, I would like to reiterate that CONTACT's role is:

- to promote and encourage the dissemination of experience and practical information;

- to provide a fast person-to-person service

- to give help when needed

- to prevent the generation of even more paperwork

- to include small localised investigations.

6. Problems

CONTACT has, of course, encountered hazards during its development. Probably the most potent has been understaffing which was the result of insufficient funding. The work is inevitably labour-intensive as was quickly discovered. One information officer and a secretary cannot cope with routine office work, inputting and updating data, promoting the service, scanning journals and periodicals, as well as the fundamental job of answering enquiries. The gratification of providing a satisfactory answer is enjoyable but, in this case, has always been tempered by the feeling that crucial maintenance work is piling up. Ideally, such a project would fully employ two committeed information officers sharing ideas, plus a well qualified and equally committed secretary.

Promotion and publicity was recognised as a crucial but complex factor for the potential success of CONTACT. Work on this was, of course, constrained by the insufficient staffing. Since the service is not designed to produce an end product, such as a bibliography or research register, it was decided that a continual but slow-growth approach should be adopted. An attempt was made to build CONTACT into the existing and accepted higher education frame work, infiltration rather than hard sell and obvious publicity. A two level strategy was felt to be necessary - firstly, to make people aware of the service and secondly, to motive them to use it.

After two years, it appears the most effective means have been a well-designed information handout; a steady stream of journal articles; visiting - to institutions, meetings, conferences. Use of the service certainly seems to be stimulated by personal contact and recommendation. However this has been hindered by inadequate staffing and funding which precludes leaving the office for long periods, as well as the payment of travelling expenses. A recorded message is not what the enquirer is seeking!

Despite the attention which had been paid by both Council and CONTACT staff to this facet of the work, promotion has not been as successful as was hoped, even given the limited finances available. HE institutions appear to have an entrenched and suspicious insularity, well demonstrated by an overall resistance to change, so CONTACT deliberately adopted a cool, rather English approach as opposed to an all singing, and all dancing assault. Perhaps the economic climate is crucial - a point which I shall be looking at later.

Two areas, not directly related to the everyday work of the service, have proved problematic and are, as yet, unresolved. These are evaluation and costing. Originally it was suggested that calls should be monitored by building in to each working day a "feedback" time. This was soon found to be quite naive. Other than careful training of the information officer so as s/he will recognise a satisfied customer, no workable means of evaluation has been devised. Costing has provided an equally thorny problem although the Council is now hoping to look at the costing of its information work overall, and this will, of course if possible, include CONTACT.

The use of information technologies is obviously relevant to the design of such a service. In this instance, "the new technology" is the telephone with a computer providing a support service updating, storing and retrieving data. It was assumed initially that CONTACT users were not likely to have, in reality, easy access to a data-base. Twenty terminals in the polytechnic computer room or a terminal in the library the other side of the campus is simply not comparable and, given the recession, the likelihood of departments, let alone individuals, having their own terminals is fast fading. Technical hitches also create delays. Since CONTACT is supported by a manual retrieval system as well as a computerised one, the chances of receiving an answer quickly are greatly enhanced and are not dependent on the machine being "up".

Conclusion

The establishment of the experimental CONTACT service clearly demonstrates some of the obstacles encountered by any educational innovation, and by information services in general in the current economic circumstances. Despite the increasing recognition being given to the value of the service, the initial funding period of two years is drawing rapidly to an end and it appears likely that the service will only be operating three days each week after March. It could be argued that, if the service had continued for, say perhaps another 18 months, its acceptability and respectability would have become firmly established and funding more easily found.

This argument is supported by a comparison with the CEDAR information officer's future, starting as it did, primarily as a short term solution to an immediate problem ie the acute and growing demand for information about computer based education. It now looks as though it will, in the future, be well supported by various sector interests in the education and training world. Is this because CEDAR's equally effective service is more conventional and thus more acceptable? Is it because it had an established base, the CEDAR project, in turn, was supported by the recent NDPCAL programme, on which to grow?

Attention also has to be given to the issue of charging for information, however awkward this is to organise in practice. Does the fact that information services are frequently free at the point of consumption reinforce the belief that information provision is something of a fringe activity? Ironically institutional managements are willing to pay for books stacked on library shelves but, shortsightedly, not for such apparently intangible and modern services as CONTACT, although it is designed specifically to save on these very expensive items - staff, time, paper. The staffing requirements of a telephone-based service are hardly extravagant, two information officers and a secretary, particularly if it is agreed that they are employed to serve, say, the whole of the higher education sector.

We can only conclude that the harsh economic reality of the 1980s, coupled with institional resistance to change, makes it virtually impossible to create new style information services for education and, more importantly, to sustain them and allow them to flourish and develop to their full potential.

Notes:

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3. Making The Best Of It - Reconciling Ends, Means And Resources In Higher Education. The final report of the Group for Research and Innovation for Higher Education, Nuffield Foundation, 1976.

I would like to acknowledge the expert help of Jessica Claridge, Judith Morris and Jill Coates, Information Officer at CET, in the preparation of this paper.

Reply

M. C. Head, School of Librarianship, RGIT

Although Jane Hustwit's paper briefly surveys the work of the CEDAR project at Imperial College, it is primarily devoted to a study of the CET's CONTACT scheme, which is in danger of extinction through lack of financial support. This would be unfortunate as the basic concept is very sound; accepting that personal exchange is often a most successful method of information transfer - a fact borne out by Don Ely's study - we see in CONTACT essentially a referral system.

There are several points in the paper on which I would like to comment:

1. We are told that the system is structured on keywords but not how many can be assigned to a particular item or whether there are any limitations. The term 'taxonomy' is used but it is not clear whether it refers to a simple classification or a structured thesaurus, nor is it clear whether the system can utilise and-or-not logic in its searches - perhaps unlikely since it is "supported by a manual system".

2. Speed of response is clearly an important factor in any information retrieval system but, for a telephone service, I would question whether the fact that "most enquiries are dealt with within 48 hours" was satisfactory. I would consider this to be an argument in favour of on-line access and feel that the paper may under-estimate the growth of availability of terminals. Would it not be possible to offer both an on-line and a telephone service?

3. The section on 'Interrogation' also raises doubts in my mind; the role of many libraries is totally misunderstood and some of Ms. Hustwit's comments are both offensive and naive; what is here presented as a new concept is in fact as old as the telephone and in fact describes the typical reference and special library situation.

4. I would have appreciated some statistics of use; without some context, phrases such as "the number of enquiries rose dramatically" are totally meaningless. Although one appreciates that staffing shortages are due mainly to lack of finance, the comparatively limited hours of availability which results would seem to be a further argument for on-line access. Throughout the paper, the advantages of the manual system are stressed but the evidence is far from convincing; for instance, with only one information officer, one would envisage just as much frustration and delay in making telephone contact as might be encountered by machine failure in an on-line system.

The conclusions arrived at in the paper are pessimistic, perhaps justifiably so given the present economic climate, but I would still question the wisdom of the softly-softly approach with regard to publicity and promotion; in these times of crisis management, it could be argued that it is better to create a demand which one knows cannot be satisfied as a lever for obtaining increased finance.

It is also possible that CONTACT has attempted to achieve too broad a coverage in terms of subject without first attempting to identify positive user needs; in her paper, Jane speaks of "the diversity of disciplines and subjects considered as comprising educational technology" and this pinpoints the problem. Whereas CEDAR has concentrated one the one aspect of computer-assisted learning, CONTACT has been operating within very vague parameters and may consequently have failed to match some of the guidelines mentioned by Don Ely, particularly those relating to the specific information needs of an identified user group.

CHAPTER 4

The Use of Query in Multi-Facet Indexing of Information Materials

W. J. K. Davies, Hertfordshire County Programmed Learning Centre,
St. Albans.

Introduction

This paper describes an attempt to use an existing computer search program to index and provide information about sources of information likely to be of use to teachers at classroom level. At the time of initiation it appeared that conventional library indexing and retrieval techniques were of marginal relevance to genuine resource based learning and also that no agreement could be reached by librarians on a standard thesaurus.

We therefore suggested that, rather than pursue the so far fruitless treadmill of an ideal retrieval program and a national database, we should concentrate on using - and developing - an available program with all its problems and advantages. This was acceptable because the academic intention was to develop data file structures purely for local and possible regional use. Therefore a standard thesaurus and nationally compatible file structure were not vital.

Indeed it is hypothesised that individuals or groups can, given a working structure, develop their own local data retrieval systems with their own local idiosyncrasies. It will be recalled that some attempts at this were made a few years ago but were defeated largely by the sheer complexity and labour-intensiveness of the, then available, manual retrieval systems such as OCCI and uniterm.

For these reasons the availability of the Hertfordshire Query programme was taken as the starting point for further development. For those unfamiliar with it, QUERY is a sequential-search program capable of being divided into a number of separate fields for each record. These fields can be numeric or string, can be interrogated singly or in multiple and can accept a variety of inputs. Its current limitations include the sequential search nature, which puts a practical limit on the size and complexity of any given datafile; the input technology using punched cards which determines an absolute top limit of 79 characters per field with a maximum number of nine cards per record; and an inability to lay out text output except with the use of elaborate procedures.

Fortunately our own requirements for local datafiles are such that only the second restriction is serious and even this is in process of being overcome (we hope!) What is proving something of a nuisance is the problem of print-out layout. Computer experts, possibly because of their familiarity with the technology, appear to pay little attention in general to the user yet his need for a clear layout of complex information is considerable. Conversely those who have started with the idea of a clear layout (most of the micro-based programs) find that there are strict limits on the amount of information they can include.

Progress so far

Our first attempt was simply to computerise a multi-facet index already existing in card form and relating to 626 back-up reading books for adolescents and adults. In retrospect this was rather simplistic since each 'facet' was in effect a single term when being retrieved (eg. Reading Age; Title) so that the multi-facet nature of the file was a genuine advantage. Each additional facet interrogated narrowed the area of search. Even the 'contents' facet, arranged as a set of keyword topics desciptors were within the same field and since it was generated from the books themselves.

The same did not apply to the next experiment which was to construct an analytical data file to retrieve sources of information about teaching. In this case we wanted to be able to:

1. provide a filter system for isolating broad curriculum areas (eg. Chemistry) thus enabling irrelevant records to be removed from review at an early stage.

2. provide an analytical device so that an enquirer could, for instance, ask for entries on the layout of print-based work materials.

3. provide a keyword (or cliche!) index to allow queries using popular terms (eg. open learning).

Not unexpectedly this proved extremely difficult to achieve, particularly with regard to 2 where false drops could be expected regularly. The original idea of combining 2 and 3 in one set of related fields proved impracticable and only after several years work has what appears to be a satisfactory compromise been achieved. The problem is endemic in any multi-facet base and will, we suspect, never be entirely solved.

The third structure was really a development of the first and arose from a need of our own to index a bank of individualised work materials produced by various LEA organisations. The multi-field nature of QUERY has enabled us here not only to categorise the materials by content under broad subject and detailed topics, but also to describe their intended audience; the uses to which the reviewer thinks the materials could be put; the activities (games; information sheets; etc.) which the materials include; selected publication data. Thus it is fairly easy to find out, for example, what games are available on oil exploration suitable for 2nd year secondary children and where they can be obtained from.

The fourth and latest structure is an attempt to provide up-to-date information about in-service education activities and sources of help available in a geographical area at a given time. This differs in nature from previous experiments since it has to be a dynamic and constantly changing file. It also raises various ethical and political problems.

All these experimental files are small - the biggest currently holds only about 700 records - but are enabling us to test out the limits of QUERY and, indeed, to suggest certain modifications. They are, of course, only part of a total retrieval system which may be simply described as:

1. Academic indexing: the process of reviewing and categorising the information source.
2. Technical indexing: formatting the result of (1) so that it can be taken into and extracted from a retrieval sub-system.
3. Storing information: so organising the formatted information that it is available at any time to enquirers.
4. Retrieval: the process of correlating and retrieving those parts of the stored information which are directly relevant to a user's needs while leaving aside irrelevant parts.
5. Dissemination: the ability to provide the retrieved information in a form acceptable to the user.

Currently 1 is virtually independent of any given computer program though it poses problems of its own. 2, 3 and 4 are largely determined by the actual storage and retrieval mechanisms selected. 5 is done largely by paper back-up systems using material selected and photocopied as a result of a computer file search by someone fully familiar with the program. Our intention is to make such searches easy enough to be operated by a direct user (eg. a teacher wanting specific items) and comprehensive enough in their results to avoid the user needing to seek further information.

The problems we face

In comparison with other 'local' programs we have seen; QUERY provides an extremely flexible base provided the user is prepared to take a little trouble but its strength is also its main weakness - its very flexibility means that, if one uses its potential to the full, there are user problems. In particular it is very difficult to get a tidy display layout unless coding is used extensively - and that in itself is not helpful to a user. Thus in BETH, the index of sources on teaching, one cannot practicably put in DESIGN of INSTRUCTIONAL MATERIALS but must say DE:IN:MA. The print out, because of the mass of data available, is very likely to wrap-around especially on a VDU. By its nature the program is also very dependent on user awareness. Unlike Dialogue - or for example the BL project - it is not structured to ask or prompt the enquirer, nor will it automatically do analytical searches in related fields (for example the BL experimental program will isolate a key term in both title and topic 'fields' and inform the user of the frequency in both while effectively saving the records in a sub-file. To use QUERY in a similar mode one would need to interrogate both fields - QUERY TITLE sub "TEACH" or PROCESS sub "TE" - and then tell the computer what details of the 'hits' you want printed out). Further more input technology using punched cards restricts the number of characters in any given field. Thus at present the system requires considerable paper back-up in the form of code-lists; subject and topic lists; and abstracts. We are designing computerised equivalents - a datafile of abstracts which can be from any data base and a data file which will enable users to interrogate the current topics lists of any given file - but these in themselves require extra work on the part of a user. We are, therefore, not yet at our destination.

Even so we have got far enough down the road to be able to see where we are going. The nature and complexity of QUERY, originally designed for use on a powerful mainframe, makes it slow to operate on current micros. It would seem likely that, in the near future at least, the best plan will be for a user to interrogate the main file either 'on-line' or by batch to mainframe and then put up a selected sub-file for local use. An alternative mode of operation is for users to go through a referral point which will carry out searches for them and provide the results in paper form, but this does lose the immediacy of response which we find so useful.

Reply

R. L. McMorran, Aberdeen College of Education Library

Mr. Davies has suggested that local or regional data retrieval systems should be developed, rather than effort being wasted on fruitless attempts to initiate national databases which could satisfy the information needs of all users. Two of the advantages of local systems have been mentioned - first the availability of existing programs (and computers to run them on) and secondly the ability of local systems to develop 'local idiosyncracies', and if by this is meant the indexing of local materials, such as teaching materials on area studies, or say, collection of reports on localised educational problems, then I would agree that it is a considerable advantage. Other advantages which I might mention are the lower costs nowadays of computers which could be used for informaton retrieval, and the fact that in a locally-based system it might be easier to identify the needs, and the changing needs, of specific groups of users.

Nevertheless, I have some reservations about a multiplicity of local systems being established in isolation from each other, perhaps duplicating the work done, each using different programs, with differing inputs, differing search strategies and differing functions. There is neither the time nor (I am sure) the necessity, for re-iterating the merits of centralised information retrieval units, in theory, for the detailed subject indexing of large numbers of items to be used for educational research, which could be available on-line to regional centres. Perhaps a case could be made out for a national information retrieval system, such as that described in the Scottish Council for Research in Education report 'Information retrieval in the field of education', published in 1974, which could be complemented by local centres which could provide access to national as well as to locally-produced files.

I think I should at least mention here the availability of ERIC. In Aberdeen College of Education we have found this useful on occasion, and both Jordanhill and Notre Dame Colleges of Education have decided that it is worthwhile to initiate the installation of computer terminals which would probably be used mainly for access to ERIC. Our enquiries are however not specifically in the field of educational technology, and our research users are not primarily 'teachers at classroom level'.

The needs of users are rightly stressed by Mr. Davies. Desirable qualities mentioned are a clear easily-understood output, immediacy of response, availability of materials indexed, sufficiently large files to satisfy enquiries, and direct operation by the information user. From the description given in the paper and after reading the user's guide to the QUERY package, I would suspect that there is some way to go before this last quality is achieved, nor am I convinced that it is a serious handicap to go through an intermediary, providing the information inquiry is clearly formulated and the intermediary readily accessible. Perhaps it might be worth while itemising one or two other user requirements. References produced should be relevant to the inquiry. The materials retrieved should be of a high quality.

Precise enquiries should be capable of producing precise responses. I feel that QUERY may have some drawbacks in these areas. The thing which surprised me most on reading Mr. Davies' paper was his dismissive remarks on aspects of information retrieval which are generally regarded as being of central importance, specifically the use of carefully constructed thesauri and the use of computer search strategies in information retrieval (I take it that this is what is meant by saying that conventional library indexing and retrieval techniques were of marginal relevance). Standard thesauri, such as the ERIC list of descriptors or the EUDISED thesaurus may not be ideal, but their use at least saves one the trouble of constructing a thesaurus for oneself. Without a thesaurus, problems will inevitably arise, from synonyms, words with related and perhaps overlapping meaning, broader and narrower terms, and terms with vague or ambiguous meaning (not uncommon in education). The more precise the indexing and the larger the file, the more essential is a thesaurus. Finally, I would like to tentatively suggest that an interactive system might be of more use to users, and that a system using file inversion rather than sequential search might give more scope for specific information retrieval.

CHAPTER 5

THE EXETER ABSTRACT REFERENCE SYSTEM ON HIGHER EDUCATION

D. Bligh, Exeter University Teaching Services

The Exeter Abstract Reference System (TEARS) is a computerised retrieval system developed by Denise Cannon of Exeter University Computer Unit to serve departments within the University. It is adaptable and can contain files storing different kinds of information such as records of films or bibliographical references. This article describes TEARS on Higher Education which primarily stores abstracts of research into teaching and learning into Higher Education.

I was appointed to provide services to University teachers in various ways. These included the provision of information and working with colleagues, particularly new staff, to develop university teaching techniques and innovations.

In 1975 there were certain local conditions which made the establishment of a computerised retrieval system seriously worth considering. The Computer Unit was interested and supportive because it wanted to provide a general facility for all departments. Also at that time I was probably better acquainted with the research literature on university teaching than most people. There was no British retrieval system in this field and, as I shall describe, it seemed that there could be good reasons to have one, but only one. Finally there had recently been growing acceptance that research into teaching and learning in Higher Education is both interesting and relevant to practising teachers.

However, while these factors made the establishment of a retrieval system seriously worth considering, they were not in themselves sufficient to make me embark upon such a long term commitment. There were general policy issues concerning (A) the academic acceptability of teaching development, (B) establishing a research orientation to teaching services, (C) the development of teaching services as a field in itself, and (D) the possible services to which a retrieval system could contribute.

I shall now consider each of these in turn.

(A) ESTABLISHING THE ACCEPTANCE OF ACADEMIC SERVICES

1. Research a common value

It is well known that staff development is an unpopular cause within universities, particularly a fairly conservative one like Exeter. It seemed important to build upon values academic staff would have in common. Research is one such common value. It would be hypocritical for an engineer, chemist or lawyer to value his own research on the grounds of its professional utility and to deny in principle the relevance of educational research to his own profession. Similarly, if a historian or linguist values the accumulation of knowlege and wisdom in his own field, it would be hypocritical to deny in principle the same possibility for other fields. Thus whether research is valued for its own sake or for its usefulness, the same value can be applied to educational research.

2. Knowledge appears neutral - no threat

Compared with many activities of those concerned to improve teaching in Higher Education, the accumulation of research information appeared to offer little threat to academics' self-esteem. Workshops on lecturing, for example, may have a "holier than thou" appearance. Furthermore, when one is new to an institution it is very easy to tread on other people's unseen corns; but the collection of information seems less likely to do so. It is not prescriptive; it provides support for academics freely taking their own decisions.

3. Reading acceptable to non-attenders

It is common experience amongst those concerned to develop university teaching that less than 20% of academic staff will ever attend any meeting or activity one cares to organise. The fear of exposure does not apply to reading, provided no great effort is required. For this reason reading should be in small quantities. It seemed that abstracts of research, unlike extracts from books, could be concentrated and sufficiently suggestive to provoke discussion.

4. Slow cognitive dissonance

The problems of acceptability and the development of teaching are problems of attitudes and attitude change. Attitudes are said to change by a process of cognitive dissonance. They change by a process of continual adjustment to reconcile "dissonant" information. I had no dogma to which I wished to convert my colleagues. Still less did I expect sudden conversions. I had a simple faith that if one could create an academic community well informed on educational research, academic decisions would be better informed and wiser.

5. The unit is to the university as the university is to society

The role of a teaching services unit within a university is like the role of a university in society. In holding this simple faith I ascribed to nothing more than the beliefs of universities themselves. One of the functions of universities is to collect and disseminate the products of scholarship. Just as universities inform the community about the world in which we live, it is part of the function of a teaching services unit to inform the academic community about the study of Higher Education.

(B) TO ESTABLISH A RESEARCH ORIENTATION

A further set of reasons for establishing a computerised retrieval system of abstracts on research into teaching and learning in Higher Education is underlain by a policy decision which is very evident from what I have already said: the Teaching Services Centre should have an academic base if not a research orientation. Two of these underlying reasons may be made summarily explicit.

1. To inform academic decisions

There needs to be a standard way of retrieving information that will inform the way teaching and administration are carried out.

2. Universities as objects of enquiry

Universities need to understand themselves as well as the rest of the world.

3. Base services on research, if possible

Similarly, if hypocrisy is to be avoided, teaching services should be research informed where possible. In the same way that universities and society itself are constantly changing, the Teaching Services Centre was young, evolving rapidly and needing to do so in an informed way. I do not mean by this that we needed to be able to quote chapter and verse of research abstracts for everything we did. That was obviously impossible. I mean that, just as the study of literature or sociology may give an understanding of why people behave as they do, so scholarship in the field of Higher Education provides a climate for wisdom and judgment in the provision of teaching services.

Naturally when members of the Centre work in consultation with academic staff they want to support their ideas with research evidence. TEARS can be used to provide this support.

4. Widespread literature

The literature on Higher Education is flung exceptionally widely in remote professional journals as well as educational ones. This means not only that academic staff would not find relevant literature even if they had the inclination to look for it; but that if members of Teaching Services are to provide an information service they will need some way of selecting what is relevant. This is the work of a retrieval system.

5. Our ignorance

Furthermore, no-one working in the field of Higher Education can know all the research relevant to every educational service that may need to be provided. Some way of retrieving what is relevant, and only what is relevant, is required.

(C) ESTABLISHING THE FIELD

I was conscious in my new job that I was a member of a new profession. I saw myself not so much as a "staff developer", as a "teaching developer" - although there may be some overlap between the two. Call it what you will, if there was an emerging profession, there were three problems in each of which an information retrieval system could play a part.

1. Delineating the field

Presumably the area of competence of this profession would be delineated by the limits of its members' knowledge or expertise. This is not of course to say that all the knowledge would be unique to members of the profession any more than medical knowledge is only possessed by doctors. Nevertheless, the earmarking of certain knowledge by putting it in the retrieval system would label it as relevant. I am not of course suggesting that the professional expertise of teaching developers consists solely of knowledge that can be put in a retrieval system any more than the skill of a doctor can be written in a textbook. On the contrary, the skill of a teaching developer is much of what he has to offer. Nonetheless, the knowledge base of the profession helps to define that profession and de-limit its areas of competence.

2. The problem of authority

The knowledge base of a profession is a source of its authority. For most professions this is established slowly and they go through early stages during which their knowledge is challenged until there becomes an established professional body which is the respected arbiter of standard Bodies such as the various institutes of engineering, the Law Society and the British Medical Association constantly strive to maintain and raise the professional standards of their members by monitoring the knowledge of entrants to their professions. Teaching developers have no such professional body. Consequently the consensus of research findings may for a time be a support to their authority. The use of a common retrieval system by teaching developers could be a way of accelerating professional consensus. This would not only further the professional identity of teaching developers, but raise their academic standards by freeing them to explore deeper or wider issues.

3. Discipline - paradigms and picture building

Most important of all I saw the use of retrieval systems as essential to the development of new paradigms for educational enquiry. This is a big issue and really requires a separate paper, if not a separate book. Nevertheless I will attempt an outline sketch of my view.

In the use of educational research there are problems of generalisability, conflicting results and simple lack of evidence. I must ask you to consider the field of education as a picture consisting entirely of dots. The dots are experimental results and all kinds of other information. Where we have no information there are no dots on the picture. In other places the picture is crowded with dots of differing complexions. The colours vary in their intensity with their credibility.

The picture requires interpretation. No one dot, nor even a few dots, are sufficient to judge the outline of a shape on the picture. Most of the picture is blank, but if we step back some general shapes can be discerned.

The construction of the picture is never finished. Although a more or less scientific approach may be desirable to specify the dots, their interpretation is an art.

Next I must ask you to think of teaching as a decision making activity. It is one of the management professions - the management of learning. When taking a decision we need only look at that part of the picture which is relevant. The decision to be taken - the question to be asked - prescribes the relevance of evidence.

What has all this got to do with retrieval systems? The information store is the picture. The information looked at depends upon the question asked. One way to interpret the information is to tabulate it in columns according to the answer or decision it implies.

(D) POSSIBLE SERVICES

Apart from theoretical issues I thought there were very practical reasons for having a computerised information service.

1. Individual needs/interests vary

Retrieval systems can produce individualised summaries of information while conventional printed material either forces academics to take a diet only some of which they may want, or to reject it altogether.

2. Interest bank

By keeping a regular search profile for different individuals it is possible to see who has common interests. In this way teachers with similar interests across the campus can be put in touch with each other or meetings can be arranged with them specifically in mind.

3. "Contact"

The national telephone information service, "Contact", funded by the Council for Educational Technology and the subject of another paper at this Conference, is partly a development of the interest bank idea. Even without this person to person information service, given sufficient resources, TEARS could be used nationally.

4. On demand

One advantage of the retrieval system is that it can be used on demand, while there is always a risk with printed literature that academics feel it is being rammed down their throats and get in the habit of using the waste paper basket.

In principle the 'on demand' facility could include on-line provision of information to seminars or other activities organised by the Teaching Services Centre.

5. Multiple classification and multiple catalogues

It might be said that an information system on cards would be just as good. While it is true to reply that the abstracts vary greatly in length so that cards are in appropriate, this reply is trivial. The attraction of the retrieval system lies in the possibilities of multiple classification and multiple catalogues. Any given abstract may be assigned an almost unlimited number of keywords by which it may be accessed while each reference in a card index does not normally appear in more than two or three places. Furthermore the retrieval system can contain more than one catalogue. For example we may only wish to consider research findings, sometimes only reports of innovations in teaching and sometimes both. It is a simple matter in a computer search to exclude all of one category or another.

II. WHAT DO 'TEARS' RECORDS CONTAIN?

The answers to this question are set out summarily in Figure 1. Authors are normally given with their surname following by their initials. C.R.A.N. stands for Computer Record Acquisition Number. The title is normally the title of the research article but in some cases we have abstracted chapters of books separately in which case the title of the book occurs in the citation.

A coden is a shortened code used by librarians to indicate specific journals. The use of the coden is simply to save computer space. Furthermore some journal titles are rather long and similar, and some are identical.

The acknowledgement gives the initials of the abstractor or the source of the abstract.

The key words are selected by the abstractor. There is considerable skill in doing this. Unlike most retrieval systems we did not set out with any theoretical notions about hierarchies of key words or their logical relationships. But we have recently been through a pruning process. The computer itself is capable of producing hierarchies and of detecting errors. For example, it can tell us how many times the key words 'Lecture' and 'Teaching Methods' occur together and how often each occurs separately. Where the word 'Teaching Methods' does not occur with the key word 'Lecture' this can be corrected.

The abstract is normally either written under the single heading, 'Synopsis', or under the experimental headings listed in Figure 1.

Figure 1. What TEARS Records Contain

- Author CRAN
- Title
- Journal or Coden
- Place where research done
  - Department
  - Institution
  - Country
- Year(s) of publication
- *Citation (volume, issue, pages, other locations)
- Acknowledgement
- Keywords
- Abstract: Synopsis or Aim
  - Sample
  - Method
  - Findings
  - Comments

* not searchable

III. SEARCHING 'TEARS'

The information base is searched by the use of key words. These are normally joined by logical operators 'AND', 'OR' and 'NOT'. Thus if you use the key words LECTURE 'AND' DISCUSSION the retrieval system would give you all research reports containing both these key words. If you searched using the profile LECTURE 'OR' DISCUSSION it will give you all records containing either or both of these two key words. The use of 'NOT' is to exclude records with particular key words.

In addition to using the key words it is also possible to search using part of the bibliographical record except the citation and the abstract itself. For example, it is possible to search for, or to exclude all articles by a given author or combination of authors, to exclude articles from a particular country such as the U.S.A., or a particular type of department (e.g. Psychology Department). Similarly it is possible to search for, or exclude, articles published before or after, or between certain years. Similarly abstracts from particular sources, such as the Society for Research into Higher Education abstracts, can be specified. Again it is possible to consider only records before, after or between particular CRANs.

For all these things there are dictionaries indicating the number of times a key word, author, etc. occur within the total information store.

The information base may also be searched using fragments of key words. For example if you were interested in 'lectures', 'lecturing' and 'lecturers', it would be possible to search for them all using 'LECT*'. This will produce any record with a key word beginning 'lect'. It would not, of course produce records using key words such as 'taped-lecture' or 'new-lecturer'. To include these the asterisk will also need to be placed at the beginning of '*LECT*'. However this would be a mistake.

The computer would also give you every reference including the word seLECTion!!

To overcome this mistake there is also a fragment dictionary in which it is possible to check for errors of the 'SELECTION' type (see Figure 3). This shows that the fragment '*LECTUR*' would avoid all references to do with 'selection' being printed.

In the first search profile written in Figure 2 the searcher was interested in comparisons of the effectiveness of Lectures and discussions.

Figure 2. Three Search Profiles

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COMPAR* 'AND' LECTUR*  'AND'  DISCUSS*  'AND'  EFFECT*
(DROPOUT 'OR' WASTAGE)  'AND' UNIVERSIT* 'NOT'
   (POSTGRADUATE 'OR' DOCTORAL)
(*EXAM* 'OR' *ASSESS* 'IGNORE' TEACHER-ASSESSMENT)
   'AND' (*ANXI* 'OR' STRESS)
```

TV-	LECTURE
VIDEOTAPED-	LECTURE
	LECTURE-ATTENDANCE
	LECTURE-COURSE
	LECTURE-DEMONSTRATIO
	LECTURE-DISCUSSION
	LECTURE-MATERIAL
	LECTURE-METHODS
	LECTURE-ROOM
	LECTURE-SCRIPT
	LECTURE-STRUCTURE
	LECTURE-STYLE
	LECTURE-TECHNIQUE
	LECTURE-TIME
	LECTURE-WORKSHOP
	LECTURER
NEW-	LECTURER
	LECTURER-TEACHER
	LECTURER-TRAINING
	LECTURING
MACROMO	LECULAR-SCIENCE
APPLICATION-OF-KNOW	LEDGE
CURRENT-AFFAIRS-KNOW	LEDGE
KNOW	LEDGE
PREKNOW	LEDGE
SUBJECT-KNOW	LEDGE
THEORETICAL-KNOW	LEDGE
USEFUL-KNOW	LEDGE
KNOW	LEDGE-ACQUISITION
KNOW	LEDGE-ADVANCE
KNOW	LEDGE-APPLICATION
	LEEDS
	LEGAL
	LEGAL-EVALUATION
	LEGAL-FRAMEWORK
SOCIO-	LEGAL-STUDIES
	LEGAL-TEXT
COL	LEGE
COMMUNITY-COL	LEGE
JUNIOR-COL	LEGE
MONOTECHNIC-COL	LEGE
OPEN-COL	LEGE
PRIVATE-COL	LEGE
PUBLIC-COMMUNITY-COL	LEGE
SMALL-COL	LEGE
TRAINING-COL	LEGE
VETERINARY-COL	LEGE
COL	LEGE-ADMINISTRATION
COL	LEGE-AGE
COL	LEGE-ATTENDANCE
COL	LEGE-ATTITUDE
COL	LEGE-CHARACTERISTICS
COL	LEGE-COSTS
COL	LEGE-ENTRY
COL	LEGE-ENVIRONMENT
COL	LEGE-EXPERIENCE
COL	LEGE-LOCATION
COL	LEGE-OF-ADVANCED-EDU
COL	LEGE-OF-ADVANCED-TEC
COL	LEGE-OF-EDUCATION

COL	LEGE-OF-FURTHER-EDUC
COL	LEGE-OF-HIGHER-EDUCA
COL	LEGE-PLAN
COL	LEGE-PREFERENCE
COL	LEGE-SCHOLARSHIP-SER
COL	LEGE-SIZE
COL	LEGE-TYPE
COL	LEGES
COL	LEGES-OF-ADVANCED-ED
COL	LEGES-OF-EDUCATION
	LEGISLATION
	LEGITIMACY
	LEGITIMATION
F	LEISHMANN
GENT	LEMAN-IDEAL
E	LEMENT
INVO	LEMENT
SUPP	LEMENTAL
E	LEMENTARY
COMP	LEMENTARY-OBJECTIVE-
E	LEMENTARY-STATISTICS
COURSE-IMP	LEMENTATION
PERSONAL-PROB	LEMS
PROB	LEMS
PSYCHIATRIC-PROB	LEMS
ACADEMIC-EXCEL	LENCE
EXCEL	LENCE
VIO	LENCE
	LENGTH
SCRIPT-	LENGTH
TA	LENT
INFU	LENTIAL
TE	LEPHONE
TE	LEPHONE-SEMINAR
TE	LEPHONE-SURVEY
INTO	LERANCE
TO	LERANCE
TO	LERANCE-OF-AMBIGUITY
ACCE	LERATED-DEGREE
ADO	LESCENT
HELP	LESSNESS
ATH	LETE
COMP	LETE
BUL	LETIN
PARAGRAPH-COMP	LETION
SENTENCE-COMP	LETION
PAR	LETT
	LETTER
NEWS	LETTER
COURSE-RE	LEVANCE
RE	LEVANCE
RE	LEVANT-STANDARDS
A-	LEVEL
ACADEMIC-	LEVEL
ACHIEVEMENT-	LEVEL
ACTIVITY-	LEVEL
COURSE-	LEVEL
CREATIVITY-	LEVEL
EDUCATION-	LEVEL

Figure 3: An extract from a fragment dictionary

IV. QUESTIONS PEOPLE ASK ABOUT 'TEARS'

The questions people ask about TEARS are broadly of two kinds. There are those about decisions we had to take to construct and maintain the system. There are other questions which are evaluative. The two kinds overlap.

(A) QUESTIONS ABOUT DECISIONS TAKEN

1. What to include

The most common question is how we decide what to include in the system. Do we filter material on the basis of its quality? If so, how are such judgments made? Do we include non-research? How much detail do we include? What are the boundaries of the field "higher education"?. Does the system have concentrations in specific areas?

Inevitably there has to be some judgment to exclude publications of indifferent quality, but there can be no single criterion for this. Educational research includes many different paradigms. On the whole the quality control is exercised when deciding what to include in the abstract, rather than the decision to include the reference at all. If we can find nothing worthwhile to include in the abstract then the article itself is not included. This means that we cast our net quite widely (there is a lot of educational research which includes one or two worthwhile ideas within pages of boring rubbish) but at least the bibliographical information gives the user the opportunity to chase up the references for himself.

At first we did not include non-research items, but with the publication of the Nuffield Newsletters on Innovation in Higher Education, we included details of innovations and we have always wanted to include scholarly intuitive work of a non-empirical kind.

The question of the amount of detail to include has always been difficult and the answer depends upon the skill of the abstracter. I have always been utterly infuriated by the ERIC abstracts which either tell you nothing at all, or that the article deals with a topic without giving any indication what it says. One of the reasons for establishing our own system and not relying on ERIC was precisely that I wanted a system to include as much information in as little space as possible. TEARS can include diagrams - anything a computer can print - but they tend to be expensive with computer space. Statistical information is very economical and so we have not been afraid to include significance levels etc. in our abstracts even though numbers may frighten some of our arts colleagues. Nonetheless, statistical surveys present a problem; one cannot reproduce their whole data base. One has to be selective by giving totals or mean scores; but, for example, it is often precisely the specific correlation between 'A' level and Degree performance in a user's particular subject that the user wants to find out.

There is no doubt that the system started with heavy concentrations in my particular field of interest, teaching methods. More recently, this imbalance has been reduced and we have often searched the literature in response to enquiries and only subsequently added the abstracts to TEARS. Indeed, it is arguable on grounds of cost, that this is the way we should proceed: store information that people have wanted to know rather than continuously carry out a massive operation in the hopes of covering everything. This is now our policy; but it has the two-fold disadvantage: first that the response to users asking new questions is not as rapid as they expect from a computer precisely because it is not a computer responding; and secondly TEARS itself gets a bad name because the user learns that it contained little or nothing on his subject. Nonetheless we do our best to give him the information.

2. What key words?

We did not, as many other systems have done, take detailed decisions on our system of key words before establishing the data base. To many information scientists this would be sheer lunacy; but the TEARS system is so adaptable that any abstract can have approaching 80 key words and initially we adopted the policy of "if in doubt, include it". This meant that the number of key words in use grew very rapidly at first, but then began to level off to a gently rising plateau. At this point we embarked upon the task an information scientist normally tries to avoid - going through all records and rationalising the key words. This meant eliminating many key words by substituting alternatives already in use, establishing cross references for these synonyms and including, where they had been omitted, those general terms, like "Teaching Methods", which are higher order key words in hierarchies of concepts. This, of course, is to ensure that someone using the key word "Teaching Methods" does not also have to specify all the different methods separately.

You will see from this that our approach to key words has been empirical rather than theoretical, axiomatic and prescriptive.

3. What are our sources of information?

When TEARS was first established I possessed a large number of abstracts on methods of teaching, assessment, student selection, independent study and evaluation together with some on student types. In virtually all cases I had read the original work myself and could vouchsafe for the quality of the abstracts.

Obviously it was impossible to maintain this workload and we soon reached an understanding with the Society for Research into Higher Education that we could include their abstracts, possibly modified to conform to our format of headings, on condition that we paid them a royalty on any income we might derive. The Centre also receives copies of the abstracts made at Kingston Polytechnic together with the College Student Personnel Abstracts which are very good, but seem to be little known in this country.

4. How is information put in?

Nowadays we simply type the information directly on to an archive file by using a computer terminal. Blocks of up to 20 records at a time are then checked before being added to the main file. This reduces the likelihood of any mishaps with the main file. Experience shows that the rules for inserting new information can be learned very quickly.

5. Do you produce summary publications?

So far we have not produced books of abstracts on particular topics, but it is something I have always had in mind. Once again it is a matter of deciding one's priorities.

(B) EVALUATIVE QUESTIONS

1. What cost? What charges?

Theoretically the University should charge the going industrial rate for any computer services to users outside the University. In practice these charges have never been applied to persons from educational institutions.

Bearing in mind that TEARS is a general system developed by the Exeter University Computer Unit for the benefit of all departments at the University, the development costs for TEARS on Higher Education are quite low. So far we have used staff paid at a secretarial rate, although those who have developed the system of keywords are clearly no ordinary secretaries! Obviously the chief cost is labour, and when the system first began I aimed for three or four records to the pound. Presumably inflation has now played havoc with this.

2. What is its rate of growth?

It was always my hope that the system would grow at up to 10 records per day or 2000 per year. This soon proved absurdly ambitious because it totally ignored all those extra jobs that inevitably go with an undertaking of this kind. It assumed that time devoted to the system was used for nothing but written abstracts and typing them at the terminal.

For the past couple of years the system has been in abeyance, and virtually no abstracts have been added. The centre simply developed other priorities. In particular, we were invited to develop the "Contact" system which is more interactive, individual and, above all, more human.

3. Who are the users?

We obtained a list of members of the University who use the system regularly, together with a record of their interests. However we obtained this list by circulating a questionnaire and this was a mistake, because in many cases the keyword formulae they submitted contained errors. We have not encouraged a great many users from outside the University and consequently the system is in relative disuse.

4. What is your error rate?

The error rate clearly depends upon the suitability of the keywords associated with each record and the suitability of the search profile that is used. One engineer who wanted to test the system by searching in an area with which he was very familiar told us that 27 out of 28 articles printed were on target. In contrast another lecturer, who was interested in language laboratories, asked for everying on 'laboratories' and everything on 'languages'; the result was an enormous irrelevant printout. Originally I thought that if a printout contained one in three records relevant to the user's area of interest, the system would be acceptable. In practice, provided the search profile is wisely chosen, the success rate within the University has been better than this. The same cannot be said for outside users.

5. Do you offer a user consultation service?

The reason for this discrepancy lies in the user consultation that is possible within the University. The language of Higher Education is not the specialist language of the ordinary academic. Consequently he cannot always choose his search profile wisely. It might be thought that the need for user consultation reduces the attractiveness of the system. The contrary is the case. Personal contact is crucial to user satisfaction. Consultation often gives the user insights which no information service alone could possibly provide.

6. What is your evaluation of TEARS?

My evaluation will depend upon the criteria I use. Using some criteria one must say that it is a failure. It is doubtful whether the value of the information supplied exceeds the cost of establishing the system. There could probably have been cheaper ways of supplying it. In one sense the fact that we are no longer able to update the system is a confession of failure. On the other hand, the system is still usable and informative.

But it emphatically does not follow from this that the enterprise was not worth undertaking or that the decision to establish the system was wrong. There are many decisions one takes in life in which one knows the chances are against success but which are nonetheless worth taking either because the benefits could be enormous, or because one sees they are a move in the right direction. Many flying machines were designed and failed before man learned to fly; but I cannot say that these attempts should never have been made because they were likely to be unsuccessful. To have failures of this kind is a normal part of the process of education - as anyone who has taught a five-year old arithmetic or reading will know. It is experience that will be built upon because it is experience along the right lines. I cannot doubt that educational decision making will one day be heavily dependent upon information retrieval systems. To give up at the start is no way to accomplish this vision.

There have already been spinoff benefits and there are more to come. The "Contact" information service grew out of this experience. The development of TEARS gave Jessica Claridge knowledge and experience on which she built the "Contact" system. Parts of the TEARS programmes have been adapted as an indexing service for academics writing their own books.

If TEARS makes a contribution to the development of viable paradigms of educational decision making, its value will vastly exceed any expenditure upon it.

My point is an old one: you cannot measure the value of research and development either in isolation, or purely in terms of their immediate consequences. Human knowledge and human endeavour are cumulative and interactive.

I hope it is clear from this paper that the creation of TEARS was forward looking. It was not so much my purpose to collect information about research in the past, as to establish a professional base in teaching development, contribute to new standards in educational decision making and take a step towards the development of new paradigms in educational enquiry. Thus its implications go far beyond the provision of information.

REPLY

M. ROEBUCK, SCOTTISH EDUCATION DEPARTMENT

Two introductory remarks: the first about the way we are discussing the topic. The context is information retrieval in educational technology. Can I take this to be only a context and equivalent to retrieval in other areas of education? Some confusion seemed to be arising in the first discussion between the role of the librarion, the role of an educational technologist, and the role of a user. The last two are the same in my understanding.

Second point: my surprise at the comments just made about the difficulty of setting up an interest among university staff in teaching methods and the apparent new discovery about the sensitivity of staff to information along these lines. Teaching in higher education was low status. Teaching in higher education can be regarded as being a rather mundane thing within the immediate domain of the HE teacher and it is not surprising that Donald Bligh could not find staff who were willing to share their problems. I am always intrigued by the ability of HE staff to ignore the existence of relevant papers and research. Don Ely's results support this. The work done by Clarke and Dunn/Gilbert also support and I recall a conference on programmed learning in chemistry in universities in Scotland in 1965 which was based entirely upon one TES article without any taking up of any references.

The paper by Bligh reviews ..... and gives a useful listing of some of the problems in this area of research orientation.

In responding I found the paper difficult to approach: is it a self-confessed failure?

Or does it have lessons for us?

Or are those lessons ones which TEARS itself should have heeded by reading the literature or making CONTACT? I do not believe things were so different 5 years ago.

My standpoint in this context is as a user of output from retrieval systems; someone who believes, idealistically, that retrieval systems can be made to operate; (they are needed, but they have to be accessible); someone who has installed a small system, albeit crude, but which has now operated for 7 years in marginal time, on minimal cost, without access to qualified staff - BUT with a clear aim: to be able to find the materials which we were supposed to have copies of.

I mentioned these last points because in practice:

> the system has to be used: therefore should not need an intermediary; it may have to depend upon non-professional staff, or cheaper staff; because,
>
> > its costs should be minimal and able to compare favourably with other means of retrieving information (which may be on the habitual path of the user).

To what extent was the demise predictable? There was no limit on keywording; considerable skill was required of the abstractor; a labour intensive inputting system appeared to be being used with very full records (though Jessica Claridge covered this by styling the system as "cumbersome".)

Further there was a promise to an audience which was insensitive to its needs - or had not yet identified a need. Clearly some people needed to use it, but were there sufficient? A point which we have to pursue here is what is a breakeven point. How many enquiries are acceptable to a critical finance officer?

On the positive side I found some interesting points which I believe we should follow up:

a. the self-correcting hierarchy or concept map. Can this be developed and work in practice? On the purest side can records be conflated where usage changes terms? Are maps of content too personal or too local to allow such self-regulation?

In our own operation the draft Eudised thesaurus was analysed and found not to be internally consistent. Foskett was unaware of this. Our analysis did allow some empirical mapping to be done of concept-maps and of changes in maps over a period of time.

b. The problem of strategy for inclusion - if you are generating who determines the need; if you are receiving how do you stimulate appropriate input?

c. How do we determine hit rate or error rate? We used to use the St Mary Cray source which provided a massive output but most of this was irrelevant - but what should the user expect, a precise return or a broad return? Our own strategy is to provide a broad return which the professional then sifts. What should the user be educated to expect? How do you get into his 'habitual pattern' (Don Ely)?

d. Are there different approaches for small scale operations as distinct from large scale systems? To refer to John Cowan's paper of several years ago the SCALE EFFECT is critical. The cost limits are different and the role of the intermediary is an important issue. What is the role of the librarian? Will librarians give status to an operation, after all the educational building regulations specify space for libraries but not for learning, staff development or central services. Should we have large scale operations continuing or make use of small scale systems? Will the large scale operation be too inflexible?

SUMMARY

A. Is it a self confessed failure ?
Would a search of the history/literature have prevented the failure .... the cold storage ?

B. Predictable problems : no limit on keywording
: considerable skills required of abstractor
: labour intensive
: very full records
: no needs recognised by audience

C. POINTS TO FOLLOW UP : Can self-regulating trees or concept maps be made to work ?
: What is error rate ? Can users be educated?
: Is there a SCALE FACTOR ?

CHAPTER 6

QUALIFIED CITATION INDEXING*: ITS RELEVANCE TO EDUCATIONAL TECHNOLOGY

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1. INTRODUCTION:

Educational technology as a discipline or broad subject area, displays several features which form classic issues for discussion among information specialists. As a subject, it has no clear boundaries. The spread of interest crosses the path of many other specialist subject areas, thus making it very difficult to define from the point of view of information retrieval. It is a subject area which comprises a highly practical element at the same time as enveloping an element of very complex research and highly theoretical work. The merging of these two aspects has already been seen through the literature to cause severe communication problems, and consequently problems of information transfer. (CLARKE & DUNN, 1977; ELY, 1979; GILBERT, 1977; HILLS & GILBERT, 1977; McALEESE, 1978). It is an area within which fashions can change very quickly - what is fashionable to study today may be tomorrow's taboo. For example, television in the nineteen seventies is now superseded by microcomputers. Unless one keeps up with the constantly changing emphasis, the terminology used in retrieving information may be totally unsuitable.

Identification of User Population

Although the subject spread is wide, it is probable that the users of educational technology information may be a select few. For example, AETT has only 268 individual members. The user body is difficult to identify, as it may be composed of people with very different subject backgrounds and interests. For an information system to work effectively, it must be in close contact with the needs of people who are trying to obtain information from it. This involves the subject coverage of the base, but also to a very large extent the terminology used, and the inference of terms like 'information' for example in different contexts and to several users will mean something quite different. A retrieval system must therefore attempt to identify the user population and acquire as much feedback from it as possible. That is, the system should 'interrogate' the user to determine the nature of the enquiry, and permit the user to 'browse' in a number of ways. (FORD, 1977; GARVEY, 1970; BROADFOOT, 1979; HOUNSELL, 1980). This can be a formidable problem, particularly for the larger systems and for any claiming international coverage. Even within a body of educational technologists, which a Conference such as ETIC will attract, there are, one suspects, many levels of understanding of different topics, and many modes of application of apparently similar information. These considerations are quite independent of the more obvious one, perhaps, of foreign language translation problems, which apply to any subject area. One would not wish to introduce a note of despair, but educational technology does have these particular features of difficulty for an information system.

2. COMMUNICATION OF RESEARCH FINDINGS: /

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* A project supported by the Scottish Education Department: 1980-1982.

2. COMMUNICATION OF RESEARCH FINDINGS:

The user body has been mentioned as being small and specialised. One can refine this statement to mean that the body of people using the literature of educational technology is small, but in a sense we are all, that is, anyone involved in teaching or communication of information at its simplest level, users of the products of educational technology and this introduces another element which is very quickly apparent to anyone coming in to the subject area: the degree of communication of research findings to practical situations is low. (CLARKE & DUNN, 1977; GILBERT, 1977). Many excellent research projects seem to find little support in practical application, and as corollary, ideas springing from difficulties met in practice seem to have little chance of support or follow-up by research for wider trial or distribution. This situation may well be a direct consequence of poor information retrieval systems, or of systems not reaching or getting through to the appropriate user population in the code or language of the user. There is very little evidence, for instance, of any effective SDI (selective dissemination of information) systems in educational technology, by which relevant selected information in some packaged form can be circulated to specific users or to small groups of research workers by matching output with pre-determined subject profiles, i.e. individualised information.

Existing Sources of Information:

It would be a relatively simple task to draw up a list of sources which claim to cover literature on educational technology from, say the British Library's collection list (KIST - keyword index to serial titles). The latest encyclopaedia on educational technology (UNWIN & McALEESE 1978) lists 38 'easily accessible and useful English-language journals', of which four are what would be termed secondary sources, i.e. bringing together titles or abstracts of primary articles in meaningful subject groups. This is omitting some of the more general sources which will include educational technology, such as ERIC, with the associated Research in Education and Current Journals in Education, and British Educational Index. Another general source, which may not be so familiar in this field, is Social Sciences Citation Index, or even Science Citation Index, both of which include much material relevant to educational technology, by virtue of their cross-disciplinary spanning. To explain further why this should be so, it may be worth spending a little time describing the principle on which citation indexing is based and its relevance to educational technology. (MARTYN, 1965; WEINSTOCK, 1971; HALL, 1970; MARTYN, 1975).

Traditional Approach to Information Retrieval:

A secondary source dealing only with literature from educational technology will miss many large areas. As has been pointed out, in a subject with as wide a spread of interest, this may be the most vital aspect of the retrieval, to draw from the whole spectrum of application in varying subject fields. Take a subject such as 'Examinations' (see Fig. 1). A traditional hierarchical approach might be to say that examinations are part of the general process of Certification, which in turn is to do with the purpose of Assessment; this is one among others of the reasons for Assessment, others being to test curriculum, or competence perhaps; further, the purpose of Assessment is only part of the general subject of Assessment, which is also concerned with problems of assessment, design of tests etc. Another user, however, might say that Examinations is too broad a description of his area of interest, and might want to make subdivision of this into types of examination, as indicated in Fig. 1. One can see that an approach like this may be very helpful, particularly if the user has little knowledge of the subject area, in guiding a user through the way in which the material in the index has been arranged. But the difficulty lies in the fact that this is only one way of looking at this whole subject area. It is one person's or organization's conceptual map of the subject. If this corresponds with the user's map, this is helpful. If, on the other hand, the reason for wanting information about O-grade results was to see if, for example, class size was an important factor, or whether physics should be taught to third year pupils, individually or in groups, for a two-hour or four-hour period, before or after lunch, i.e. the user's conceptual map was of a sociological nature in this instance, then the hierarchical type of approach may not be helpful.

Principle of Citation Indexing:

In an attempt to satisfy both these criteria, the approach of citation indexing is to assume that in many instances a user will have a specific problem in mind - he may know that X in Newcastle did some work on it, and that in fact, there was a good article defining just what it was, but it was several years ago and is now out of date. Rather than thinking of trying to define it in terms of subject keyowrds or patterns to match against an existing index, the approach is to concentrate on the people considered to be key writers or workers on the topic. The basic assumptions made are (1) that the key author will have written papers with lists of references, but, (2) and more importantly, that other authors or workers will have quoted this author in their lists of references. Citation indexing thus takes the lists of references, or cited publications, and indexes those in such a way as to link them with the authors citing or quoting them, thus working forward in time rather than back. This can be seen to be a subtle way of covering a very broad spread of linked subjects, since a key paper on O-grade results, might have been quoted by someone writing on achievement testing, someone looking at class sizes and also be someone interested in, say, social class and learning. By finding people who have quoted this paper, one can then follow up similar work in a meaningful way without the restriction of a framework of keywords or subject hierarchies or language or time divisions. One can demonstrate this very clearly in educational technology by taking a definable topic of interest, such as 'evaluation'. An educational technologist , knowing a little about the field, might be able to say immediately that there have been one or two 'key' people working in that area - one paper which keeps being quoted, for instance, being that by Parlett and Hamilton, first published in 1972 as 'Evaluation and Illumination'. By following these two key authors through a citation index such as the Social Sciences Citation Index*, it will be found that this paper has been quoted not only by other authors writing on evaluation,but by writers in librarianship, physics, computing, health, psychology and so on. These papers will all have been written since the 'key ' paper, and one can choose approximately from the indication of journal title, which ones will be of interest. Thus one can follow a 'key' paper forward in time. One can, of course, still trace backwards as well, as each citing paper will quote others which may also be relevant and so on. In fact, the main disadvantage of citation indexing is that it is almost too helpful, and that like many other information systems, there is a danger of producing more information than a user can absorb. It does have the same disadvantage of time delay as traditional indexing, in that any secondary source, by definition, depends on first receiving and absorbing the current literature - it is possible, however, that the digestion process is shorter, as there is less emphasis on subject division and classification.

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* SSCI, published by the Institute for Scientific Information, Philadelphia, USA

Qualified Citation Indexing:

We consider that citation indexing, for the reasons given above, is particularly suitable for application to educational technology, but we also feel that the selection process applied must be looked at in the light of the above statement on the volume of information displayed. The point at which our project starts, is to examine ways in which a citation index might be refined, and to assess, by feedback from users, the most meaningful ways in which this might be achieved. We are setting up a qualified citation index in educational technology, indicating not only links between papers and those who quote them, but also the kind of link, or kind of relationship between cited and citing papers. It is in this sense that the index will be qualified - the nature of the relationship between papers will be indicated. To do this, it is necessary to examine each reference in the context in which it appears and assess, according to some 'formula' the author's reason for citing or quoting this reference.

Qualifiers

We started with an arbitrary list of relationship terms or 'qualifiers', taken from several sources (Table 1). There have been several papers written describing systems previously attempted (LIPETZ, 1965; WEINSTOCK, 1971; VOOS, 1976: FROST, 1979: HUANG, 1968; MARGOLIS, 1967; OPPENHEIM, 1978), but terms were taken also from random suggestions made by people in the course of their own reading. A very small pilot study was undertaken by two educational technologists at this stage using selected articles and personal interviews and discussion of them, and although this did yield more and very helpful suggestions, it was decided that it would be extremely time-consuming and expensive to do this on a larger scale at this stage. Instead the arbitrary list of terms drawn up was distributed, with introductory comment, to a group of lecturers and to a class of post-graduate librarianship students, all of whom were assumed to be involved in reading to some extent! They were asked to mark any term on this list which described the relationship between references and text of articles read, and in addition, if the description did not fit, to try to describe the relationship between references and text of articles read, and in addition, if the description did not fit, to try to describe the relationship in some other way. We conducted a similar pilot study with authors of papers. We therefore ended up with a kind of league table of relationships which were found to be useful, and additional possibilities. This is the type of very simple consumer test we wish to carry out in educational technology, with as many interested users as possible. We have used the 'top 20' terms on articles included in the data base constructed so far, and will now test reactions to these from educational technology users. Ideally, the relationships to be effective must be unambiguous and clear, and must be mutually exclusive. They must also be sufficiently easy for an indexer to apply unequivocally, so that the total indexing time and therefore cost, is not increased unnecessarily. The effect of these terms or 'qualifiers' on the output from the data base will be that instead of being able to get an answer to the question 'Who has done similar work to A on this topic?', we will now be able to ask 'Has there been a review article written along the same lines as the paper by A?', or 'Who else has used A's paper in a historical sense?', or 'Can I find another 'key' paper on a topic similar to that investigated by A?'.

Keyword Facility:

A simple keyword coding of the subject content of publications has also been included in our records. This is not to be regarded as a principal search strategy, but as a secondary help, if an author is not known. While one is naturally looking for information on a subject, one must remember that the subjects are in no way grouped or even rationalised to any great extent - as explained previously, there is intentionally no requirement from the user to fit his subject search in to a pre-determined pattern. The keywords are intended to allow a user to find out which are the 'key' authors or 'key' papers on a topic, and taken the search by author from there. This area is again open to discussion and modification by interaction with users.

Conclusions

We are thus approaching what we regard as a semi-intelligent system. Our aim will be to produce something which will be recognisable as english on-line, which we can 'chat' to, or interrogate informally, or browse through, i.e. the user can be creative and change strategy on receiving further prompts, to select relevant information from the mounds with which we seem to be perpetually presented.

The aim of the Project is to produce a working computer-based index open to modification through discussion with users on for example the use and understanding of qualifiers; the definition of a 'key' paper; the allocation of keywords and even to such physical details as the length of record and abbreviations used. An attempt will also be made at costing the running of such an index.

Future:

As has been demonstrated by ISI, many permutations of citation information are possible once a base is established, and specialist output, such as print-outs of review articles on a specified topic, would be relatively simple spin-off effects. There are also refinements which one can carry out on the base itself, such as building in automatic counting or 'weighting' of references, so that assessment of various publication patterns might be made from time to time.

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A Sample Search on SOUCIT, the system being developed at RGIT, is attached to this paper.

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*We should like to thank a number of colleagues who are helping us in this project: in particular John Cowan, Nick Rushby and Bernie Stocks.

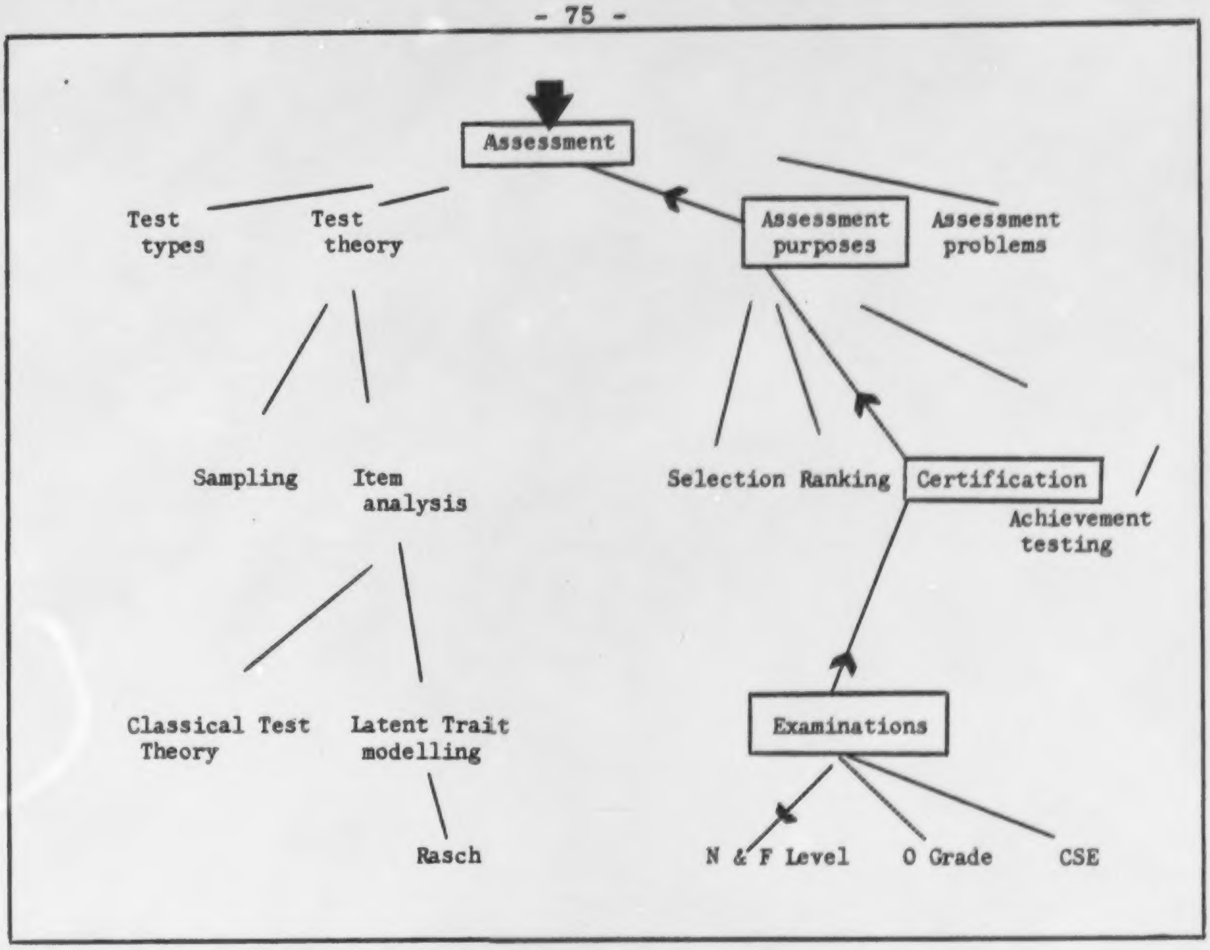
Assessment
Test types
Test theory
Assessment purposes
Assessment problems
Sampling
Item analysis
Selection
Ranking
Certification
Achievement testing
Classical Test Theory
Latent Trait modelling
Examinations
Rasch
N & F Level
O Grade
CSE

Figure 1: The relationship between Assessment, Examinations etc
(subject headings taken from the SED Information System
restructured by A. Lyndsay for the SED)

- Paying homage
  - Credit
- Bibliographical leads for researchers
  - Review
- Historical
  - Background reading
  - Narrative
- Definition
  - Clarification
  - Illustration
- Anticipated value
  - New research
- Methodology
  - Equipment
- Correction
  - Criticism
  - Disputing
  - Disclaiming
  - Contradictory research
- Substantiation
  - Corroboration
  - Similar research
  - Similar work
- Statistics
  - Data
  - Practical application

Table 1: Relational Qualifiers (i.e. descriptions of the type of relationship between a reference quoted by an author and the context of the quotation).

References
(with possible Relational Qualifiers)

	Relational Qualifiers
BRITISH LIBRARY. Keyword Index to Serial Titles (KIST)	Bibliographical leads
BROADFOOT Patricia (1979) Educational research through the looking glass. Scottish Educational Review 11(2) 133-142.	Corroboration
CLARKE Laurence J & DUNN William R (1977) Initial study of the use of research in educational technology by practitioners of educational technology and curriculum development. Final Report to the Council for Educational Technology. (spiral) 41pp.	Similar research
ELY Donald P (1979) The dynamics of an information system for educational technology. In-Educational technology twenty years on. Edited by G Terry PAGE & Quentin WHITLOCK. London, Kogan Page. (Aspects of Educational Technology. XIII) pp. 310-316.	Background reading
FORD Geoffrey (Editor) (1977) User studies: an introductory guide and select bibliography. University of Sheffield Centre for Research on User Studies. 92pp. (236ref.) (CRUS Occasional Paper no. 1)	Corroboration Review
FROST Carolyn O (1979) The use of citations in literary research: a preliminary classification of citation functions. Library Quarterly 49 399-414.	Similar research
GARVEY William D; Lin Nan; NELSON Carnot E (1970) Communication in the physical and social sciences. Science 170(3963) 1166-1173.	Corroboration
GILBERT J K (1977) An investigation into the use of research findings by some practitioners of educational technology in England. London, CET.	Background reading Similar research
HALL Angela M (1970) Use and value of citations: a state of the art report. London, Institution of Electrical Engineers. (INSPEC Report no. R70/4)	Definition

	Relational Qualifiers
HILLS Philip & GILBERT John (Editors) (1977) The spread of educational technology. London, Kogan Page. 474pp. (Aspects of Educational Technology. XI) p.263.	Background reading
HOUNSELL Dai; MARTIN Elaine; NEEDHAM Gill; JONES Haydn (1980) Educational information and the teacher. British Library, Boston Spa. (BLRD Report 5505)	Corroboration
HUANG Theodore S (1968) Efficacy of citation indexing in reference retrieval. *Library Resources and Technical Services* *12*(4) 415-434.	Similar research
LINE Maurice B (1981) The structure of social science literature as shown by a large-scale citation analysis. *Social Science Information Studies* *1* 67-87.	Clarification
LIPETZ Ben Ami (1965) Improvement of the selectivity of citation indexes to scientific literature through inclusion of citation relationship indicators. *American Documentation* *16* 81-90.	Similar research
MCALEESE R (1980) The nature and dissemination of educational technology: lessons and implications. Paper presented at the 16th National Conference of the National Society for Performance and Instruction, San Francisco, 21-25 March 1978. *Scientia Paedagogica Experimentalis* *17*(1) 44-60.	Background reading
MARGOLIS J (1967) Citation indexing and evaluation of scientific papers. *Science* *155* 1213-1219.	Similar research
MARTYN John (1965) An examination of citation indexes. *Aslib Proceedings* *17*(6) 184-196.	Definition
MARTYN John (1975) Citation analysis. *Journal of Documentation* *31*(4) 290-297.	Definition
OPPENHEIM Charles & RENN Susan P (1978) Highly cited old papers and the reasons why they continue to be cited. *Journal of the American Society of Information Science* *29* 225-231.	Similar research

	Relational Qualifiers
UNWIN Derick & MCALEESE R (1978) Encyclopaedia of educational media communications and technology. London, Macmillan.	Bibliographical leads
VOOS Henry & DAGAEV Katherine S (1976) Are all citations equal? Or, did we op.cit. your idem? *Journal of Academic Librarianship* *1*(6) 19-21.	Similar research
WEINSTOCK Melvin (1971) Citation indexes. In-Encyclopaedia of librarianship and information science. Volume 5. Edited by Allen KENT & Harold LANCOUR. New York, Marcel Dekker. pp. 16-40.	Definition

……………………………………………………

REPLY

L. CORBETT, STIRLING UNIVERSITY LIBRARY

On the scope of Edtech

Perhaps naively I've thought educational technology or edtech was concerned with the knowledge, use and effectiveness of equipment applied to educational techniques - not really concerned with theory and experimentation in eg examination and assessment - while one cannot divorce the science of the subject from its technology I should not expect edtech to be concerned with the "science" except as related to the use or effects of technical methods or devices. I had a look at some edtech books on my library's shelves and see that there are divergent schools of thought on this matter of the scope of edtech within the education field.

In the paper I can see some relevance for "Education and illumination" eg Parlett & Hamilton's work, when considering the effectiveness of some project using edtech techniques - graphics, slides, tapes ... video ... as this was important and indeed much argued about in a major project I was involved in in the library/information field viz The Travelling Workshop Experiment - and colleagues on this made good contribution to this subject. I pose a question later to get your views -

On the quoted use of research in edtech by its practitioners I had a look at another of Dr. McAleese's papers in the journal SPE (Scientia Paedagogica Experimentalis). While we find that research in the library/information field is also ignored by most practitioners - good or significant research ideas or findings do get attention from the conscientious - who in any field, let's face it, tend to be a minority. Dr. McAleese has some interesting quotes in his paper (SPE).

> "60% of those who publish research papers do so on a one-time basis ..."
>
> and for reviewers of research in a particular topic - "an overly large proportion of the data ... must be considered somewhat trivial ..."
>
> again "At the present most of the research seems confused ..."
>
> again and I feel a kinship with the information field - "inductive reasoning, hypothesis testing, scientific methodology may not be appropriate to the social sciences .... assumptions about variables makes model building suspect ....

Moving on to Citation indexing -
To the edtech practitioner or 'researcher' - as in any subject field an important method of getting into the literature is following up a known paper - whether found by serendipity or from a colleague - this tends to be preferred to using subject indexes or abstracts - or libraries/information people. John Martyn's 1965 Aslib paper touches on this - if you have time or inclination it is as good an entry to what citations are about as you'll find.

The prime examples of citation indexing are the massively impressive publications of the Institute for Scientific Information - the Garfield empire-which combine all three approaches to retrieval - the contents lists of pertinent journals and books, the keywords of titles as subjects, and citation following ie the references given in papers by their authors. ISI's files have over 7 million references. Handling such - and any level of citation indexing indeed - must use computers - manual handling is impractical.

ISI's citation indexing is unqualified. Ingenious means are used to reduce the labour/cost intensive operations of analysing the contents of thousands of journals including many in the edtech field - however you choose to define that. One is Project Keysave which checks all new citations against a huge online file - and over 60% of new input is found to have been used in the file before (see p. 42 vol. 3 Essays).

Still on methodology - citation indexing has to be continuous - if say there are 500 references on a particular topic over a 5-year period maybe 30% will be referred to, i.e. cited in one subsequent year.

You can by "cycling" catch a large proportion of the 500 by examining the references in this 30%.

So an edtech citation index as an ongoing system needs to be very sure of subject scope required and the range of sources that suit its intended users. I haven't looked in detail at ISI's coverage of edtech for UK users - naturally there's some US bias and it doesn't stretch to minor journals and newsletters or trade/technical- and availability of its printed form is presently very limited

A feature of citation following which this project seeks to alleviate is "Noise". If you check out the titles of "cited" papers retrieved by a citation index maybe only one-third will be subject relevant - and that applies whether the subject specialist or a library/information intermediary looks at the titles.

I was asked to pose some questions to entice you to react to this exciting subject - I have seven -

1. On Scope - For you are - Examinations
Certification
Assessment -edtech?

1A " " For you - Is analysis of
'O' grade results
2 or 4 hour periods
lunch hours -edtech?

2. Retrieval

Do you prefer following up -
References/citations
Using subject indexes/abstracts

3. Usefulness

Following up selected citations
Are you frustrated by many which are just "paying homage" or "historical"

4. Frustration — When you see a reference like SCIENCE 155,123- Do you react "What year?"

5. Getting — How much frustration from trying to get a copy?

6. You — When you write something - do you make the title meaningful and clear?

A Sample Search on SOUCIT, the Qualified Citation Index being developed at RGIT.

★○ - User response

```
○ run soucit
 Have you used this program before? "Y" or "N".
○ n


  This is a Qualified Citation Index,that is entries
  have been made from bibliographies of written papers
  indicating links between publications quoted in the
  bibliography or   list of references (cited publications)
  and the context in which they have been quoted.
  (citing publications).
  The Index may be searched either  by Author ("A"),
                             or by subject keyword ("B").
  If searching by author there are a number of alternate
  approaches which will be explained during the search.

  Which approach do you wish to take first,"A" or "B"?
  Please type "A"<RETURN> or "B"<RETURN>.
○ a
  Please give the Author's name you wish to search on:
          (for example   "HAMILTON"<RETURN>  )
  The Program will accept the correct Name if you already
  know it.
          (for example  "HAMILTON D"   )
  Authors Name?
○ ham
  Name not found in this form. Similar names are...
  HAMILTON D
  HAMILTON F
  HAMILTON H
  Authors Name?
○ hamilton d
  Do you want biographical information on this author? "Y" or "N"
○ y
  DEPARTMENT OF EDUC.,UNIV.OF GLASGOW
  In the Index are listed publications by the Author as
  principal or joint author,and items which cite one or more
  publications by the Author. You may choose to see all publications,
  in which case you will be given a straight list. If you wish
  to see the lists of references attached to each of the publications
  you should choose "C" (CITING).
  If you wish to do a Citation search ("B")
  you will be given a list of publications by this author which
  have been CITED by others,with details of the citing authors
  and relationships between the papers in each case.

  Input "A" to see all publications by this author (ALL)
  Input "B" to see items by this author which have been
  cited by others (CITED)
  Input "C" to see items by this author with their
  lists of references (CITING)
○ a
  There are 10 publications by HAMILTON D
  Do you wish to see them all?
○ n
```

```
You may limit the list in one of the following ways:

    1. By YEAR e.g. only publications in the last 3 years
    2. By TYPE OF PUBLICATION e.g. only review articles
    3. By SUBJECT KEYWORD
    4. By the NUMBER OF TIMES a paper has been CITED e.g. the 3
         papers most frequently referred to by others
    5. By selecting KEY papers - papers which have been given
         a particular weighting


 Indicate your choice of limitation by typing the appropriate number.
○ 1
  Type the year or range of years (separated by a space) from which you
      wish to see publications.
○ 1976 1977
  HAMILTON D
  1976
  CURRICULUM EVALUATION


  HAMILTON D
  1976
  IN SEARCH OF STRUCTURE:ESSAYS FROM AN OPEN PLAN


  HAMILTON D
  1976
  SOME CONTRASTING ASSUMPTIONS ABOUT SURVEY ANAL


  HAMILTON D
  1977
  BEYOND THE NUMBERS GAME:..EDITED BY D HAMILTON..


  HAMILTON D
  1977
  EVALUATION AS ILLUMINATION


  HAMILTON D
  1977
  ILLUMINATIONS AND RUMINATIONS


  HAMILTON D
  1977
  IN SEARCH OF STRUCTURE


  Do you wish for more bibliographical information on any one publication?
  'Y' or 'N'
○ y
  Please type "Year" and "First five characters of title".
                (for example: "1976IN SE")
○ 1977beyon
               BEYOND THE NUMBERS GAME: A READER IN EDUCATIONAL
               EVALUATION.EDITED BY DAVID HAMILTON; DAVID JENKINS
               CHRISTINE KING; BARRY MACDONALD; MALCOLM PARLETT

  No further information
```

```
   Do you wish for a citation search on any one publication?  'Y' or 'N'
○  y
   Please type "Year" and "first five characters of title."
○  1977in se

   Cited by
             *HAMILTON D
              1977
              ILLUMINATIONS AND RUMINATIONS
              IN-RESEARCH INTELLIGENCE 3(1)22-23
                   Article
                   Background reading
                   Methodology
   No further information.


   Authors Name?
○  hamilton d
   Do you want biographical information on this author? "Y" or "N"
○  n

   Input "A" to see all publications by this author (ALL)
   Input "B" to see items by this author which have been
   cited by others (CITED)



○  b
   There are 8 publications by this author which have been cited by others.
   Do you wish to see them all?
○  n
   Option unavailable at present
   Authors Name?
○  hamilton d
   Do you want biographical information on this author? "Y" or "N"
○  n

   Input "A" to see all publications by this author (ALL)
   Input "B" to see items by this author which have,been
   cited by others (CITED)
   Input "C" to see items by this author with their
   lists of references (CITING)
○  b
   There are 8 publications by this author which have been cited by others.
   Do you wish to see them all?
○  y


   1972
   EVALUATION AS ILLUMINATION
   CENTRE RES.EDUC.SCI.EDINBURGH.OCCAS.PAPER 9


   Cited by
             *PARLETT M
              1977
              EVALUATION AS ILLUMINATION
              IN-BEYOND THE NUMBERS GAME.EDITED BY D HAMILTON
                   Article
                   Conference Paper
   Cited by
             *HAMILTON D
              1977
              ILLUMINATIONS AND RUMINATIONS
              IN-RESEARCH INTELLIGENCE 3(1)22-23
                   Article
                   Paying homage
```

```
Cited by
          *FJALLBRANT N
           1977
           EVALUATION IN A USER EDUCATION PROGRAM
           IN-JOURNAL OF LIBRARIANSHIP 9(2)83-95
                Article
                Definition
Cited by
          *HEWITT C
           1978
           EVALUATION
           IN-ENCYCL.EDUC.MEDIA COMMUN.ED.UNWIN.PP.338-346
                Article
                Paying homage
                Bibliographical leads
                Clarification


1974
CLASSROOM RESEARCH:A CAUTIONARY TALE. BY D HAM...
IN-RESEARCH IN EDUCATION 11 1-15


Cited by
          *MCALEESE R
           1978
           UNDERSTANDING CLASSROOM LIFE.BY R MCALEESE & D..
           SLOUGH, NFER PUBLISHING CO.
                Article
                Disputing
                Similar research
■etc.....
Authors Name?
○ hamilton d
Do you want biographical information on this author? "Y" or "N"
○ n

Input "A" to see all publications by this author (ALL)
Input "B" to see items by this author which have been
cited by others (CITED)
Input "C" to see items by this author with their
lists of references (CITING)
○ c
There are 3 publications by this author with lists of references.
Do you wish to see them all?
○ y


1977
EVALUATION AS ILLUMINATION
IN-BEYOND THE NUMBERS GAME.EDITED BY D.HAMILTON


Citing
          *PARLETT M
           1972
           EVALUATION AS ILLUMINATION
           CENTRE RES.EDUC.SCI.EDINBURGH.OCCAS.PAPER 9
                Article
                Conference Paper
```

1978
UNDERSTANDING CLASSROOM LIFE.BY R MCALEESE & D H
SLOUGH, NFER PUBLISHING CO.

Citing
    *MCALEESE R
    1978
    NATURE AND DISSEMINATION OF EDUCATIONAL TECHNOL..
    SAN FRANCISCO,NAT.SOC.PERFORMANCE & INSTRUCTION
        Article
        Experimental detail
        Development of ideas

Citing
    *HAMILTON D
    1974
    CLASSROOM RESEARCH:A CAUTIONARY TALE. BY D HAM...
    IN-RESEARCH IN EDUCATION 11 1-15
        Article
        Disputing
        Similar research

Citing
    *HOBBS S
    1976
    CIP TEACHING ANALYSIS MANUAL
    GLASGOW, JORDANHILL COLLEGE
        Article
        Theory
        Similar research

Citing
    *SKINNER B F
    1969
    CONTINGENCIES OF REINFORCEMENT
    ENGLEWOOD CLIFFS, PRENTICE-HALL
        Article
        Background reading
        Definition

1977
ILLUMINATIONS AND RUMINATIONS
IN-RESEARCH INTELLIGENCE 3(1)22-23

Citing
    *CRONBACH L J
    1975
    BEYOND THE TWO DISCIPLINES OF SCIENTIFIC PSYCHOL.
    IN-AMERICAN PSYCHOLOGIST 30(2)110-127
        Article
        Conference Paper

■ etc.....

APPENDIX

Programme

Wednesday 1 April
RGIT Kepplestone, Room E4

9.45 INTRODUCTION R. McAleese
9.55 Task on identifying individual needs in information retrieval
10.05 D. Ely: The information-seeking behaviour of users

10.25 *******COFFEE*******

10.40 Reply to D. Ely. N. Rushby
10.55 DISCUSSION
11.10 J. Hustwit: Information services in practice
11.25 Reply. M. Head
11.35 DISCUSSION
11.50 Working Information Systems:
1. W. Davies: The use of Query in multi-facet indexing of information materials
2. J. Claridge: The Exeter Abstract Reference System on higher education
By D. Bligh
12.20 Reply. M. Roebuck
12.30 DISCUSSION

12.45 *******LUNCH*******

2.00 E. Duncan: Qualified citation indexing - its relevance to educational technology. By R. McAleese; D. Anderson; E. Duncan
2.20 Reply. L. Corbett
2.35 DISCUSSION
2.50 Formation of Working Groups
The group task will be to identify ways in which information needs may best be fulfilled in one of three specific areas
GROUP DISCUSSION

3.20 *******COFFEE*******

3.40 GROUP DISCUSSIONS (contd)
4.15 Report back from groups
Synthesis
5.00 Finish

APPENDIX(contd)

LIST OF DELEGATES

ETIC '81

INFORMATION RETRIEVAL IN EDUCATIONAL TECHNOLOGY

One-Day Symposium

Wednesday 1 April 1981

PARTICIPANTS:

ANDERSON F D	Senior Lecturer, RGIT School of Librarianship, St. Andrew Street, ABERDEEN
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